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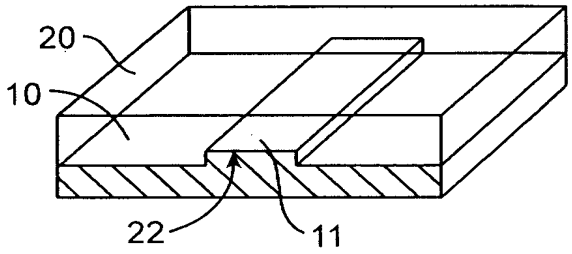


FIG. 1

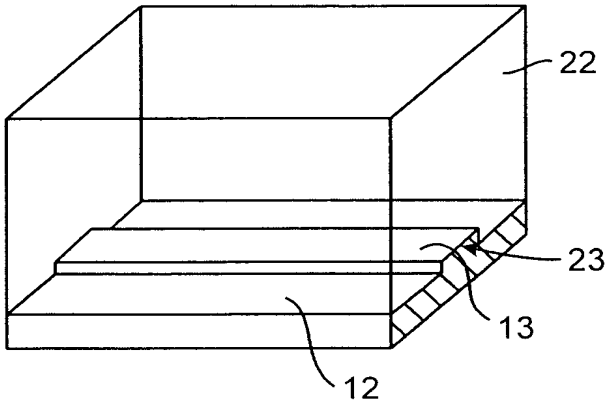


FIG. 2

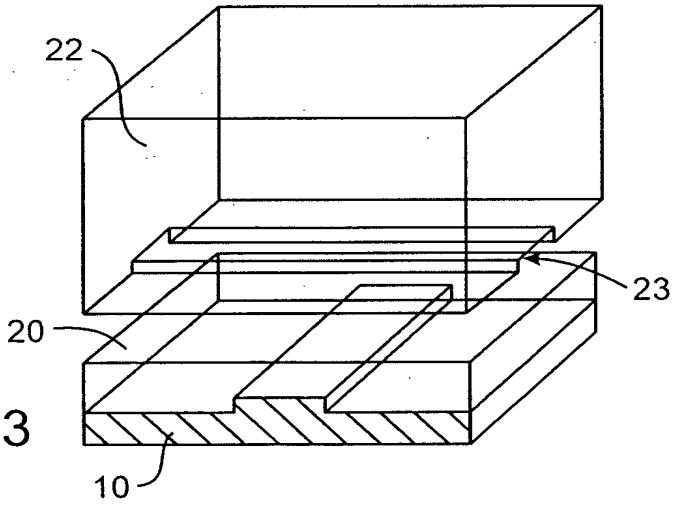


FIG. 3

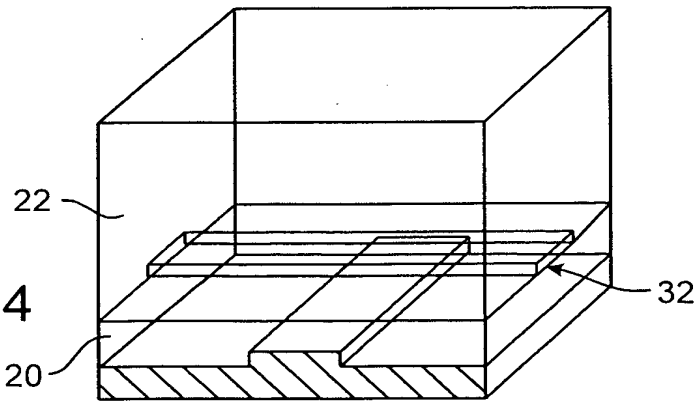


FIG. 4

BEST AVAILABLE COPY

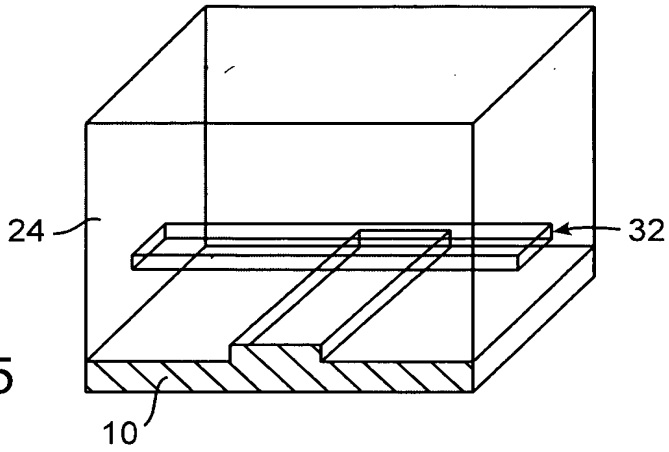


FIG. 5

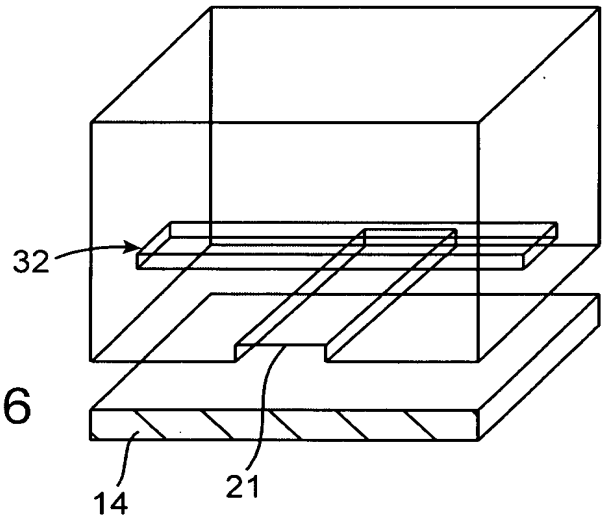


FIG. 6

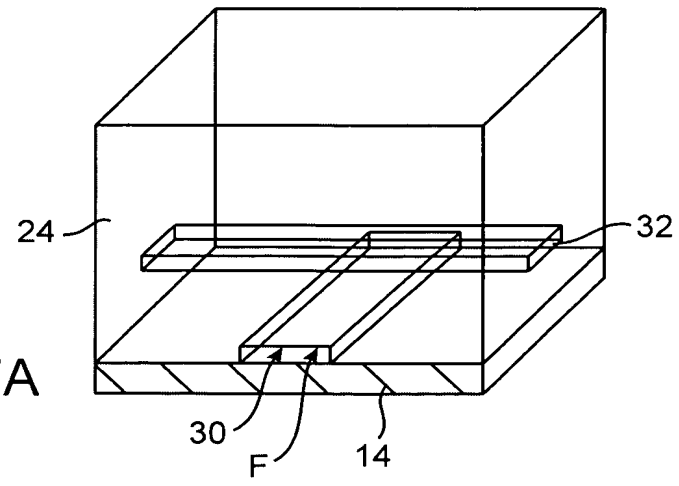


FIG. 7A

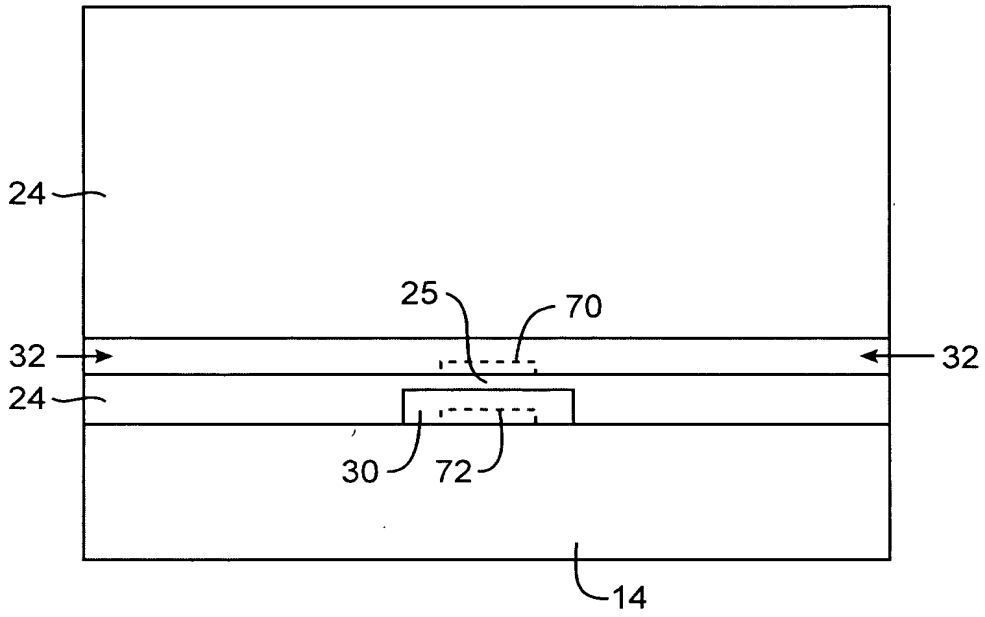


FIG. 7B

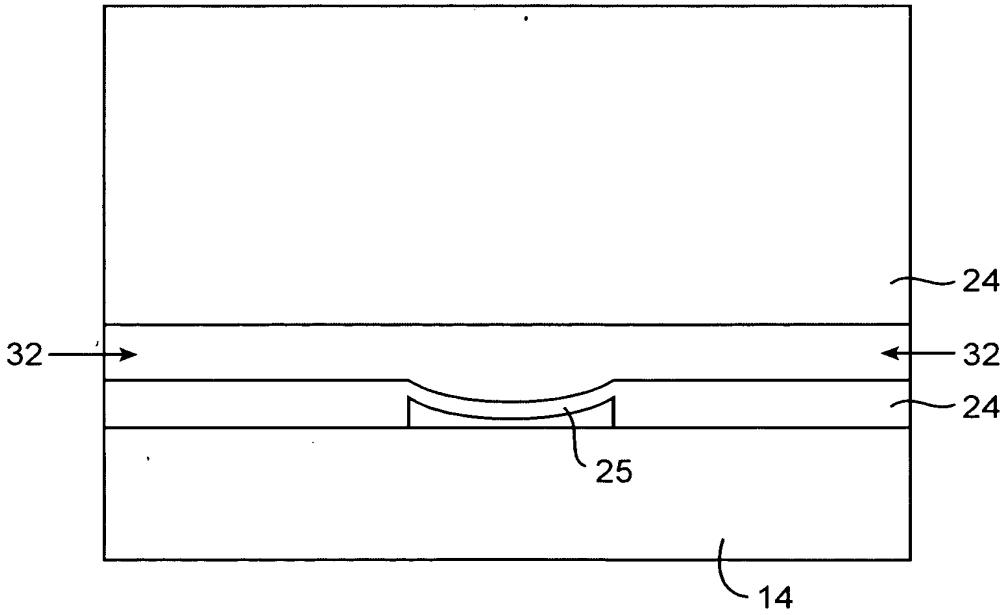


FIG. 7H

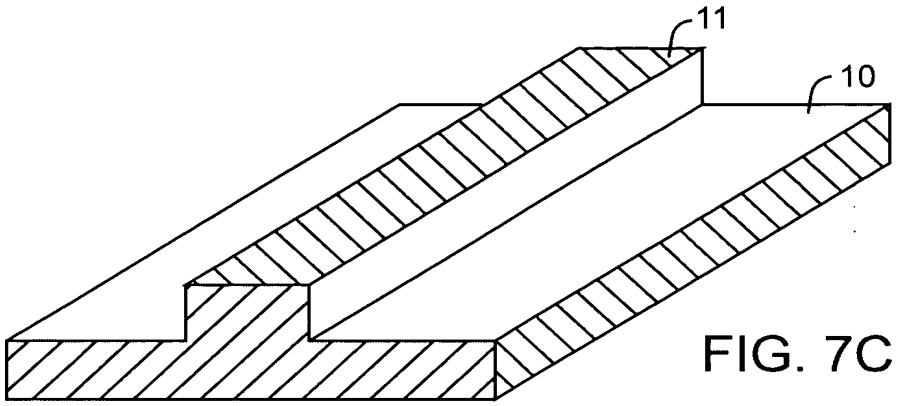


FIG. 7C

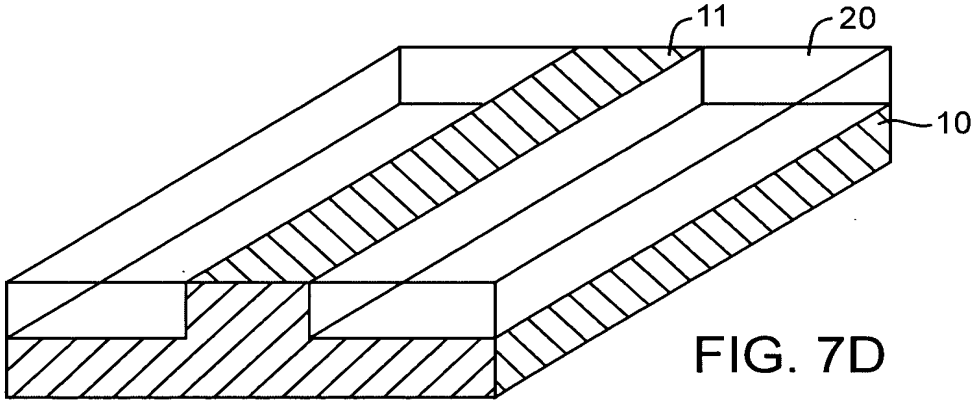


FIG. 7D

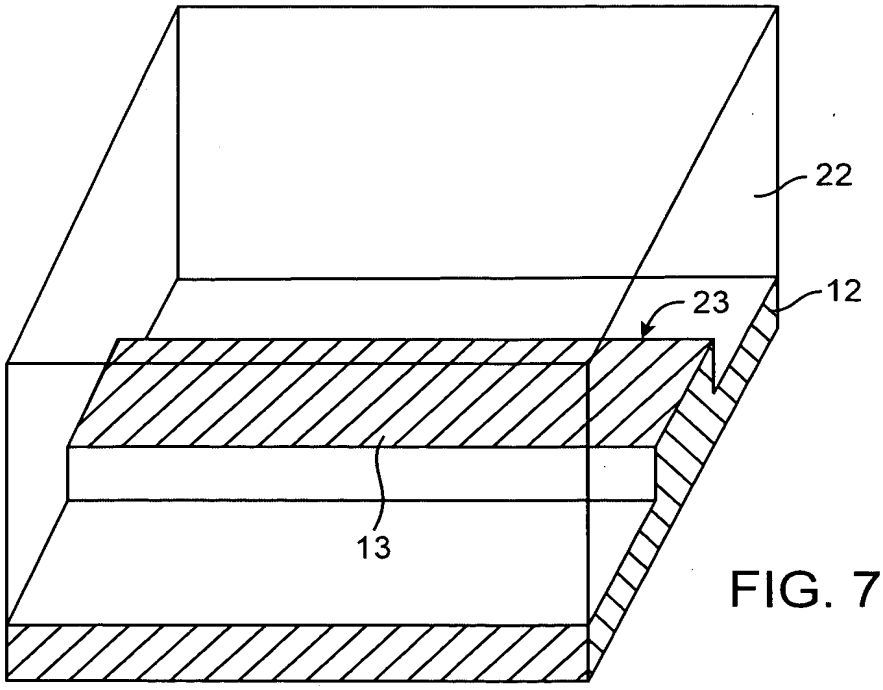


FIG. 7E

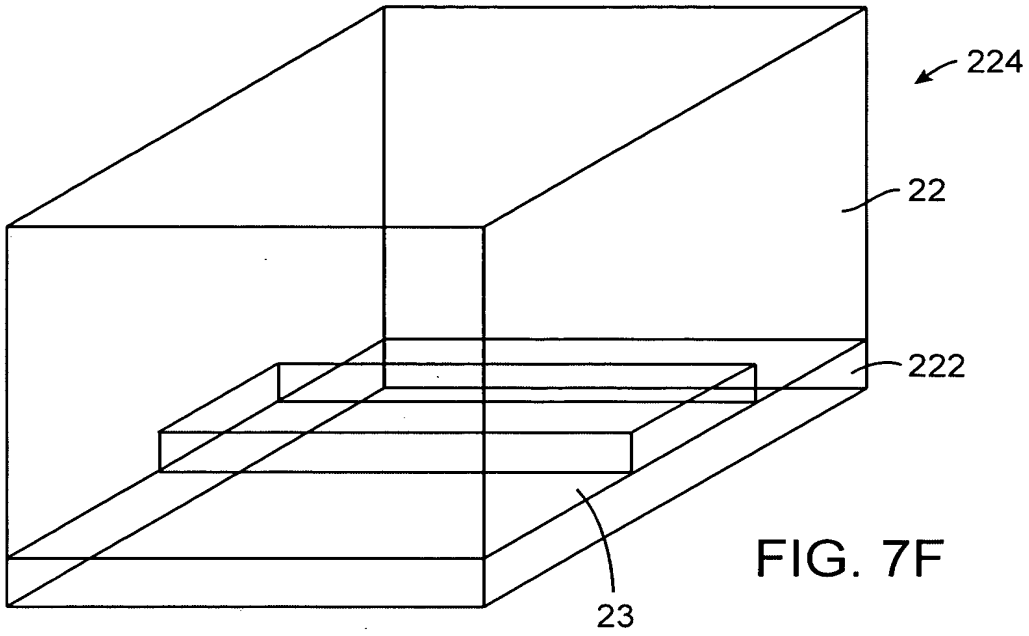


FIG. 7F

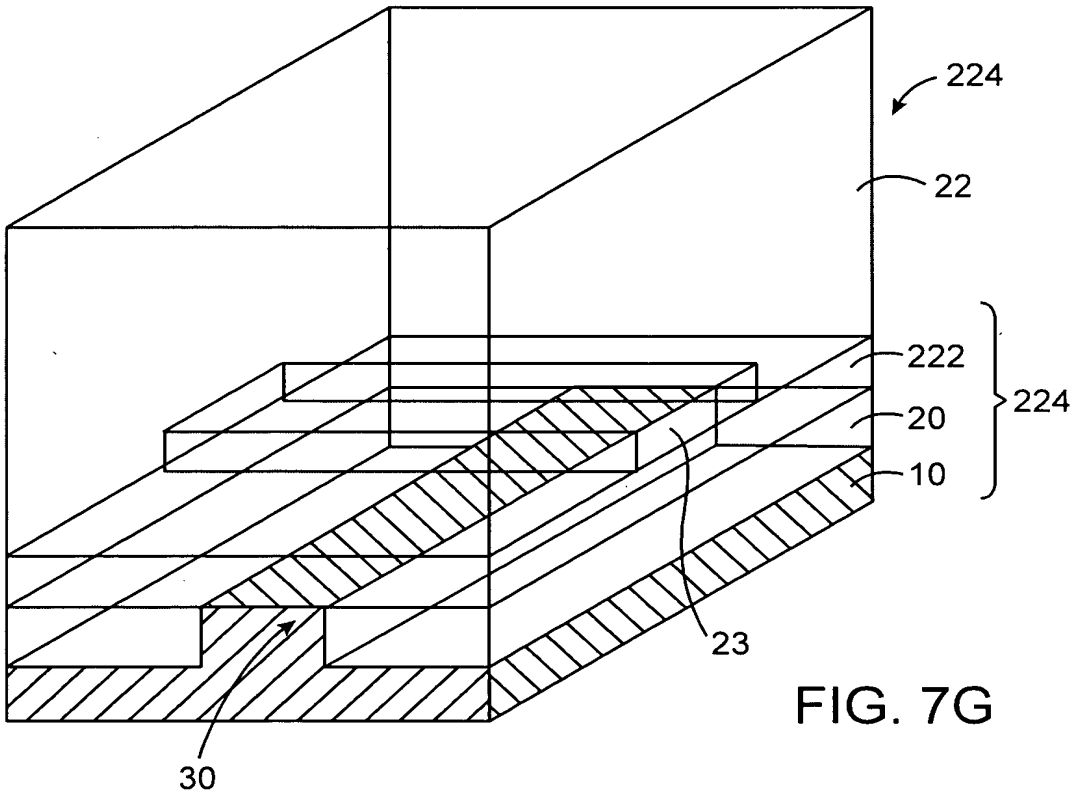


FIG. 7G

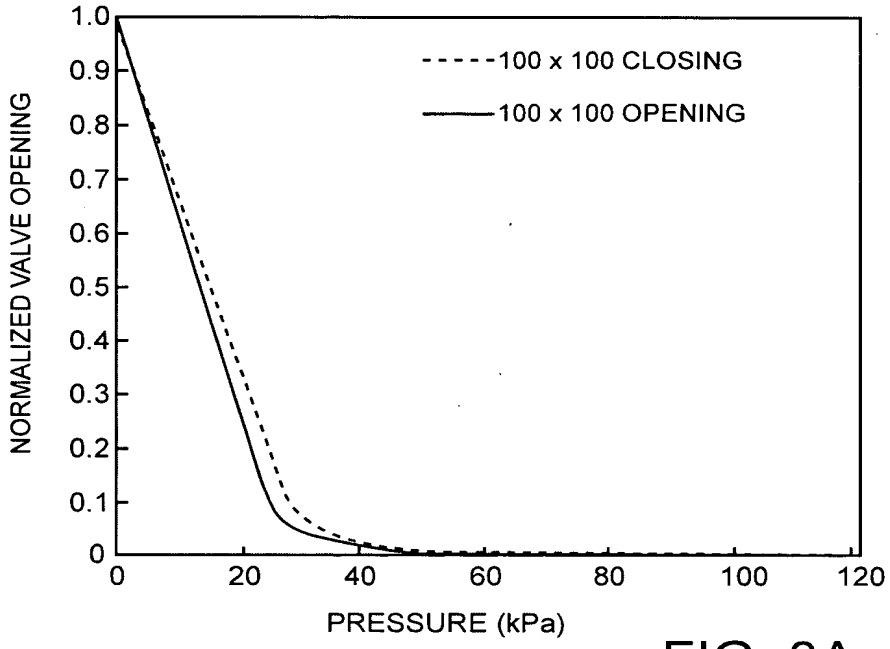

NORMALIZED VALVE OPENING
PRESSURE (kPa)
100 x 100 CLOSING
100 x 100 OPENING
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
0
20
40
60
80
100
120

FIG. 8A

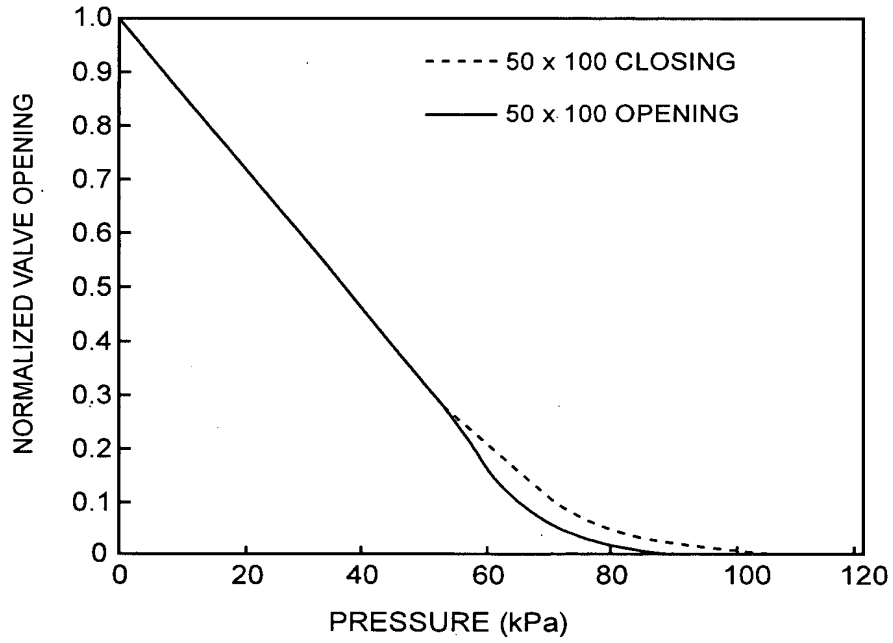
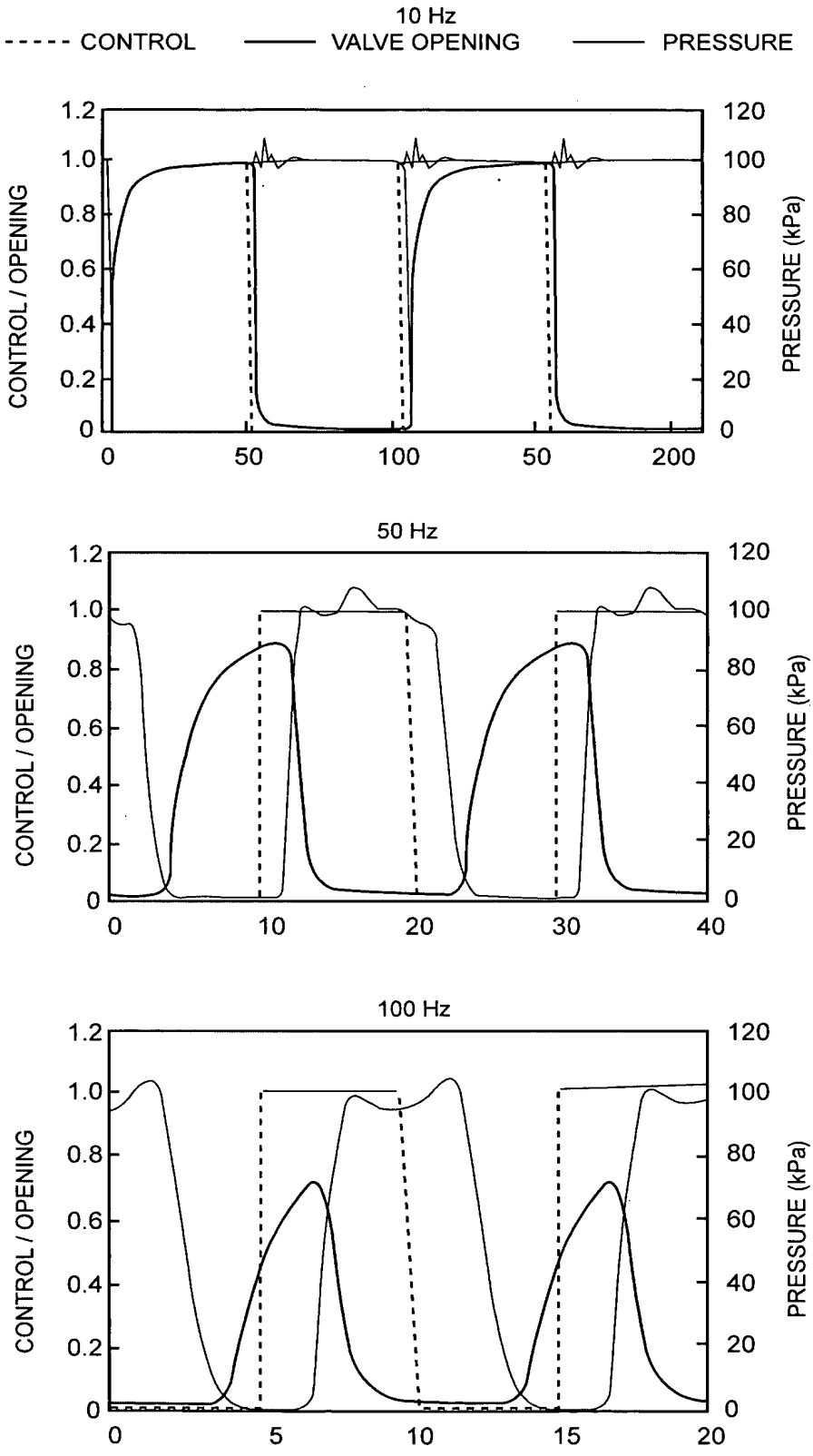

NORMALIZED VALVE OPENING
PRESSURE (kPa)
50 x 100 CLOSING
50 x 100 OPENING
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
0
20
40
60
80
100
120

FIG. 8B

FIG. 9


10 Hz
CONTROL
VALVE OPENING
PRESSURE
CONTROL / OPENING
PRESSURE (kPa)
50 Hz
100 Hz

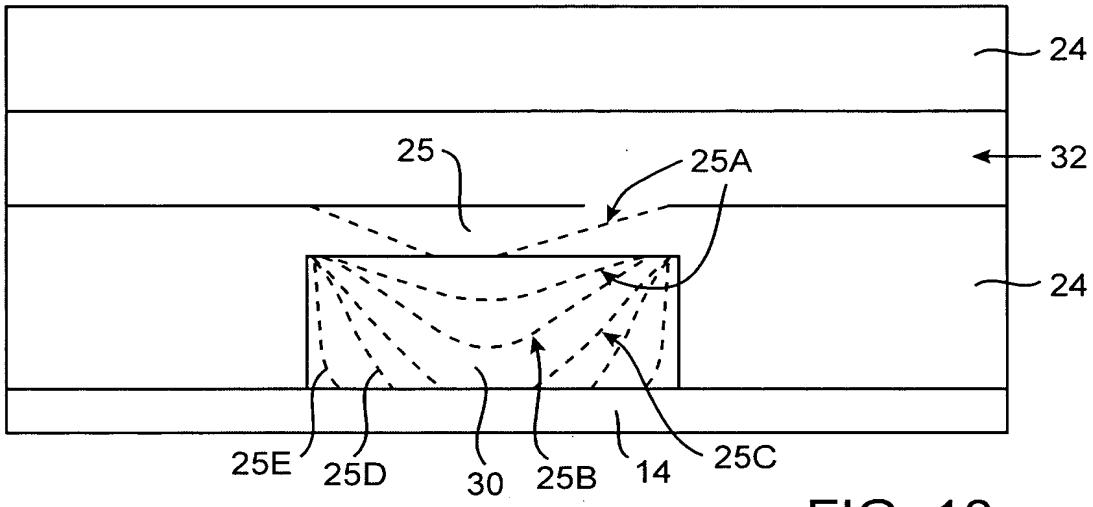

24
32
25
25A
24
25E
25D
30
25B
14
25C

FIG. 10

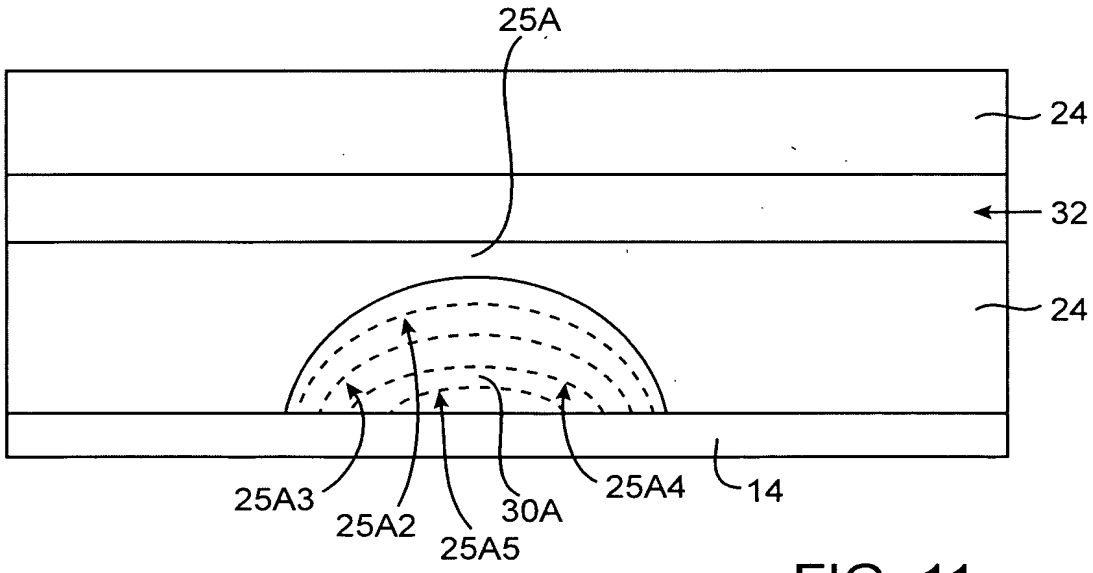

25A
24
32
24
25A3
25A2
25A5
30A
25A4
14

FIG. 11

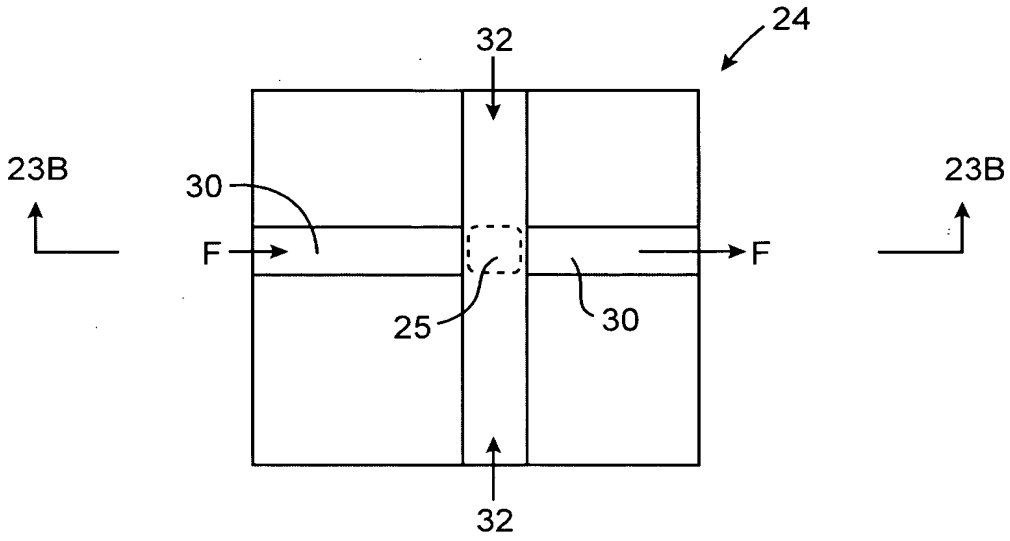


FIG. 12A

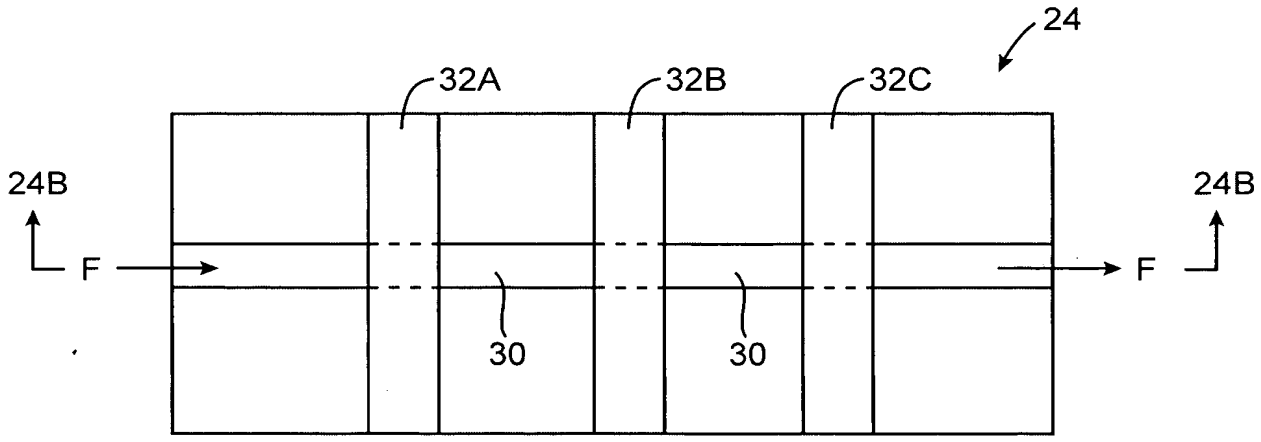


FIG. 13A

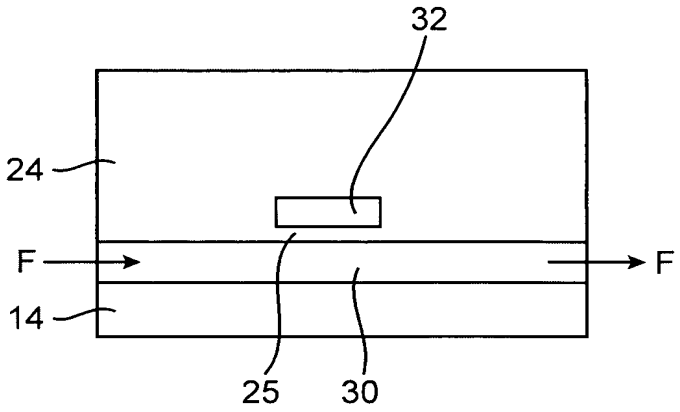


FIG. 12B

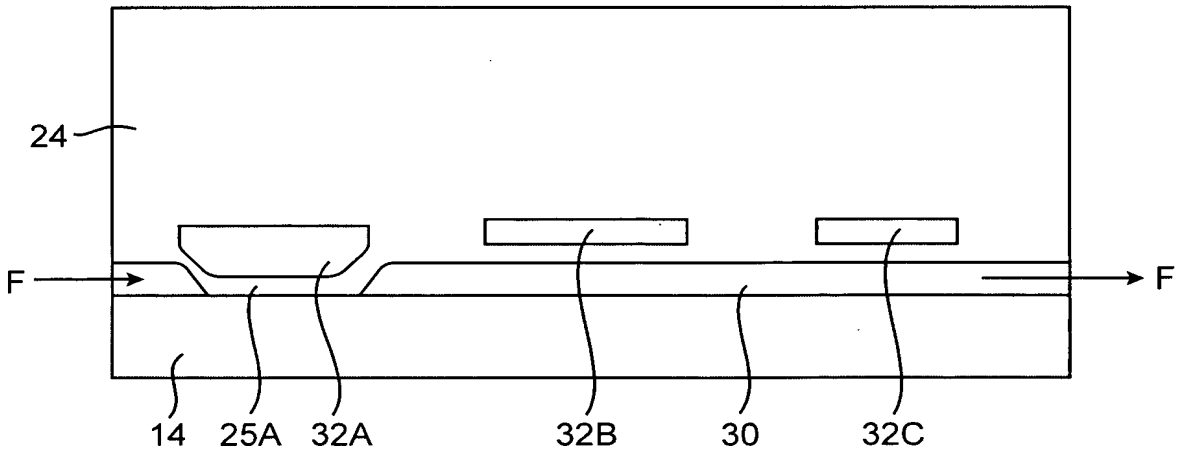


FIG. 13B

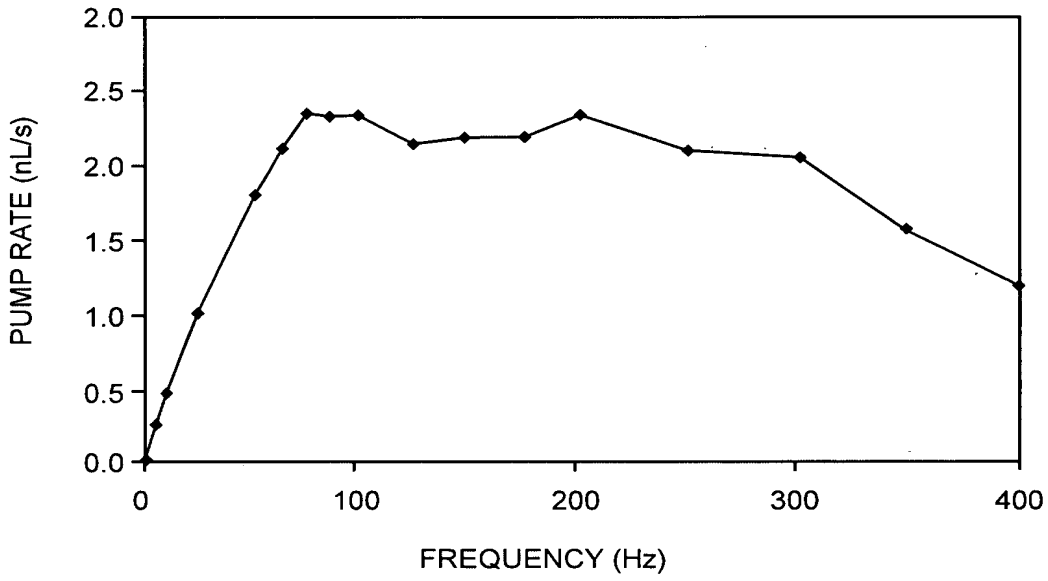


FIG. 14

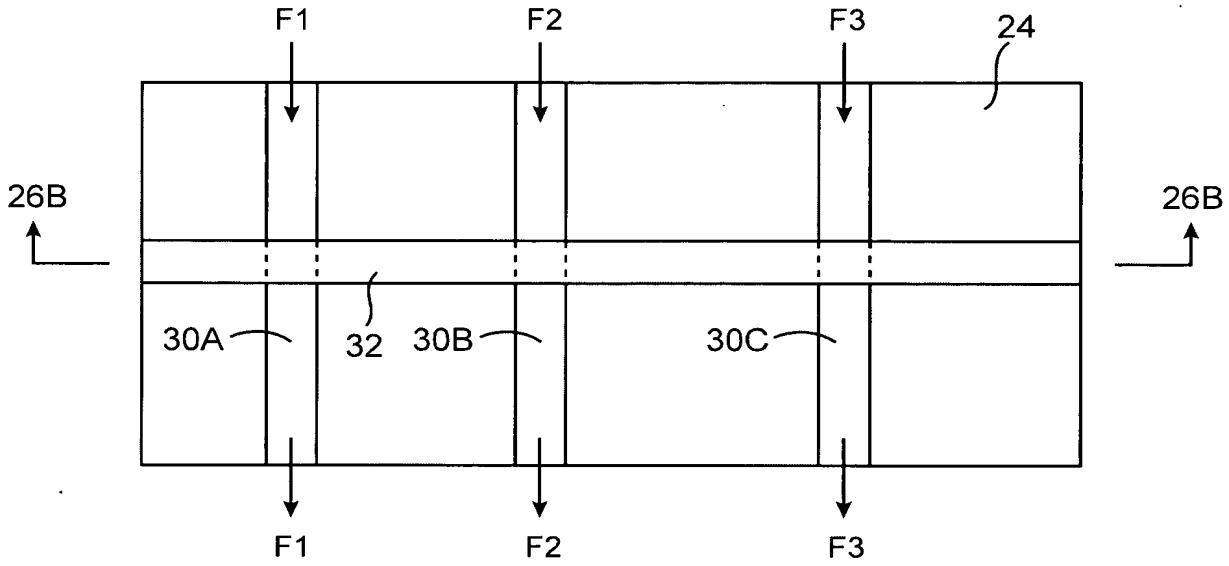


FIG. 15A

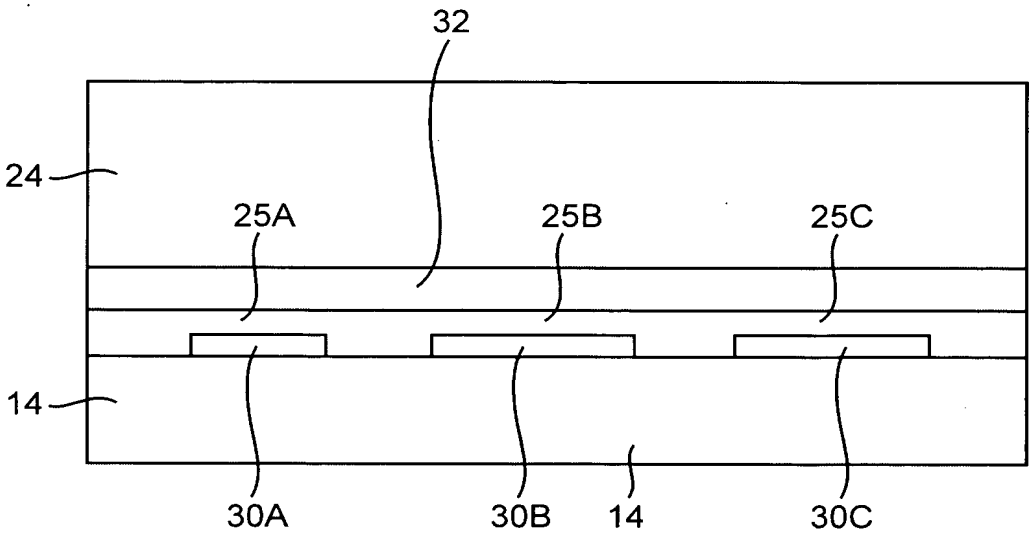


FIG. 15B

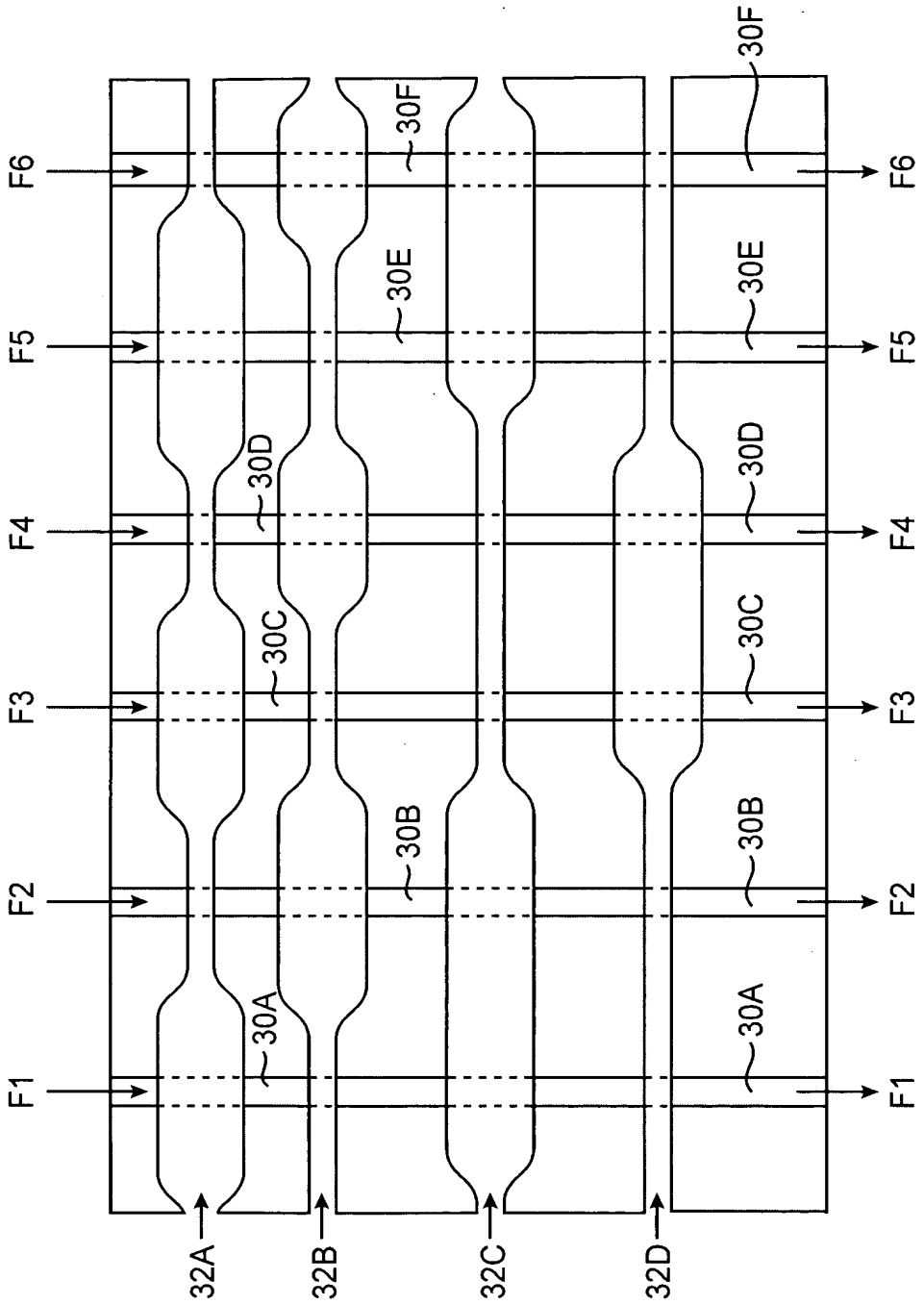


FIG. 16

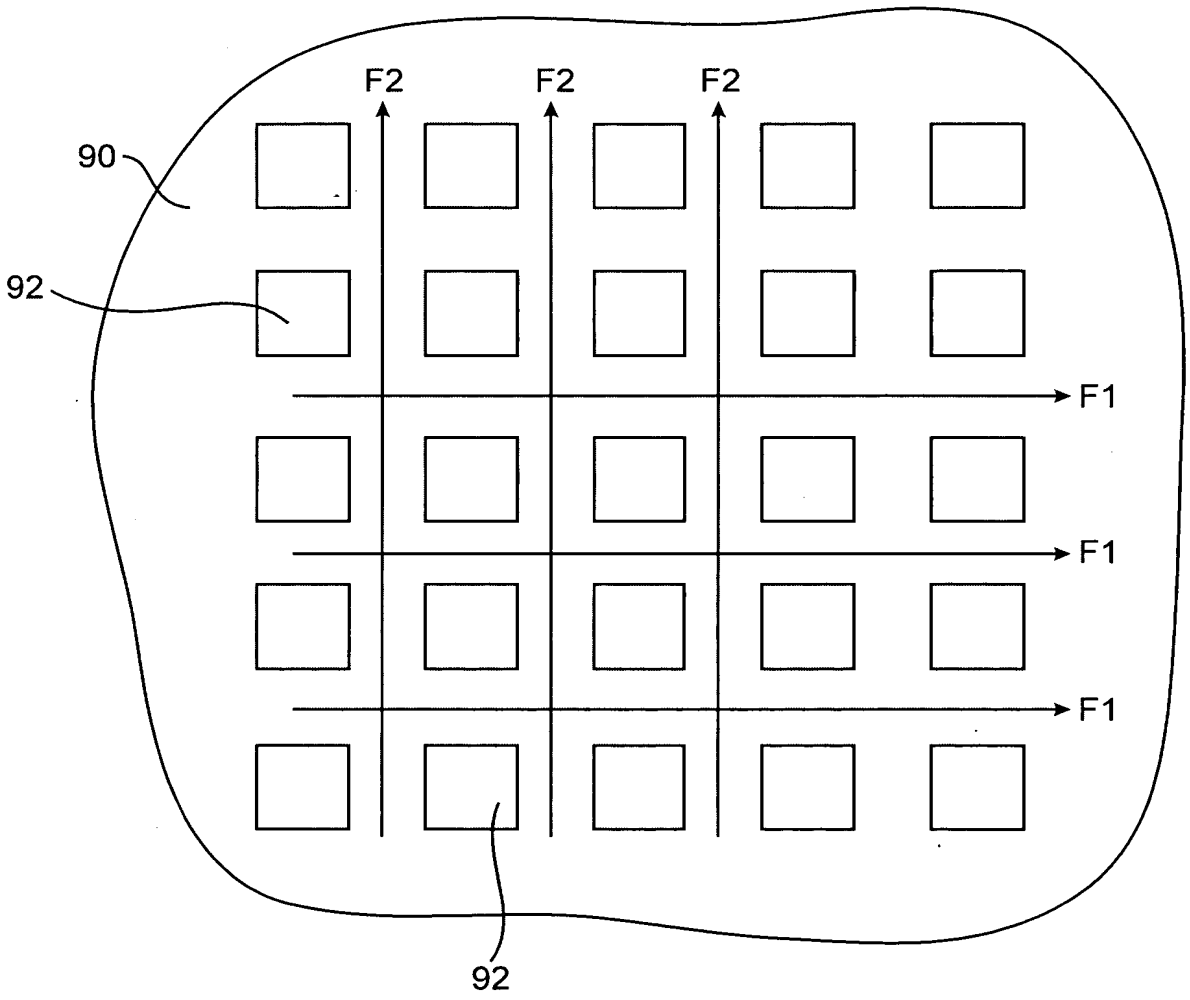


FIG. 17A

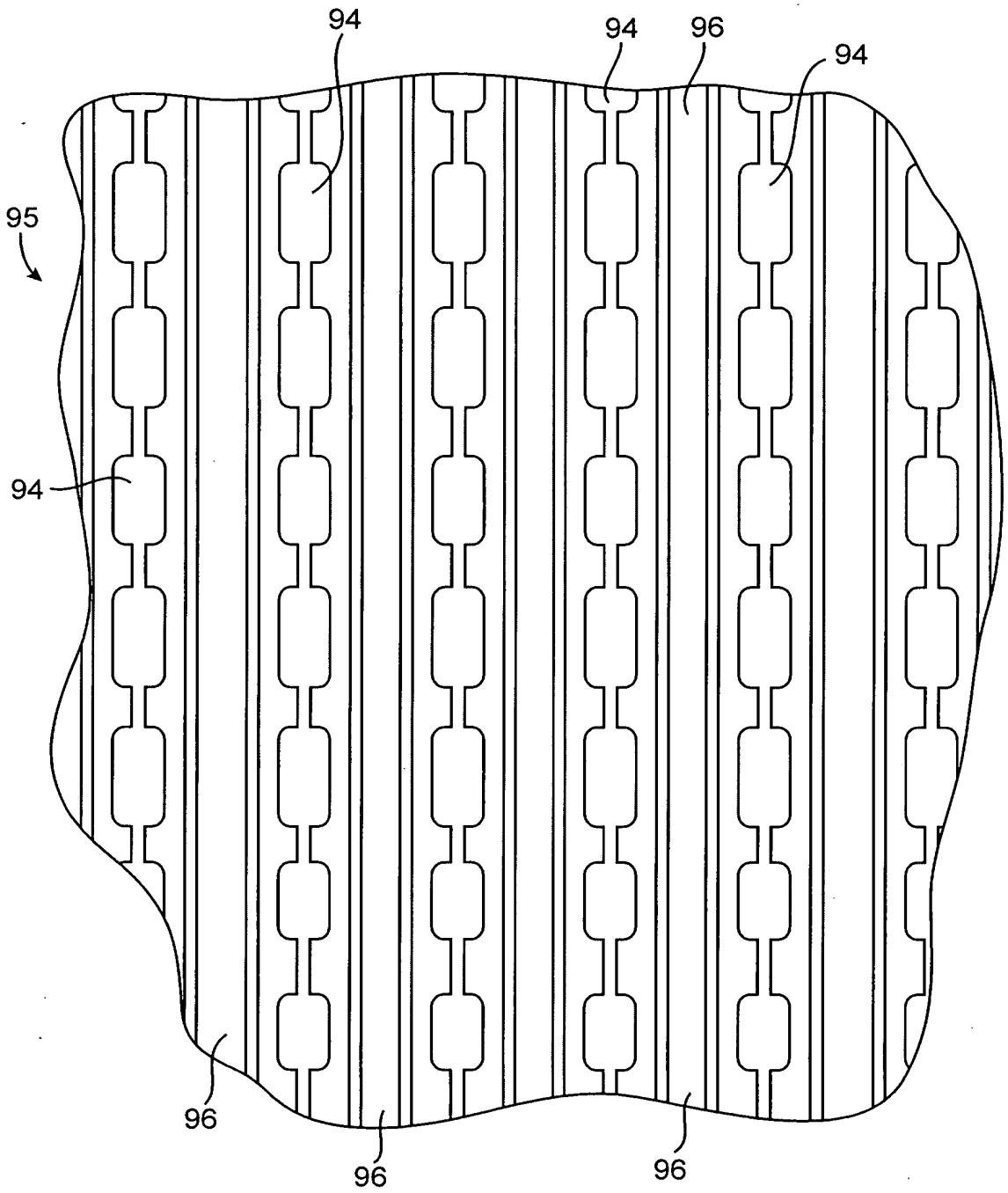


FIG 17B

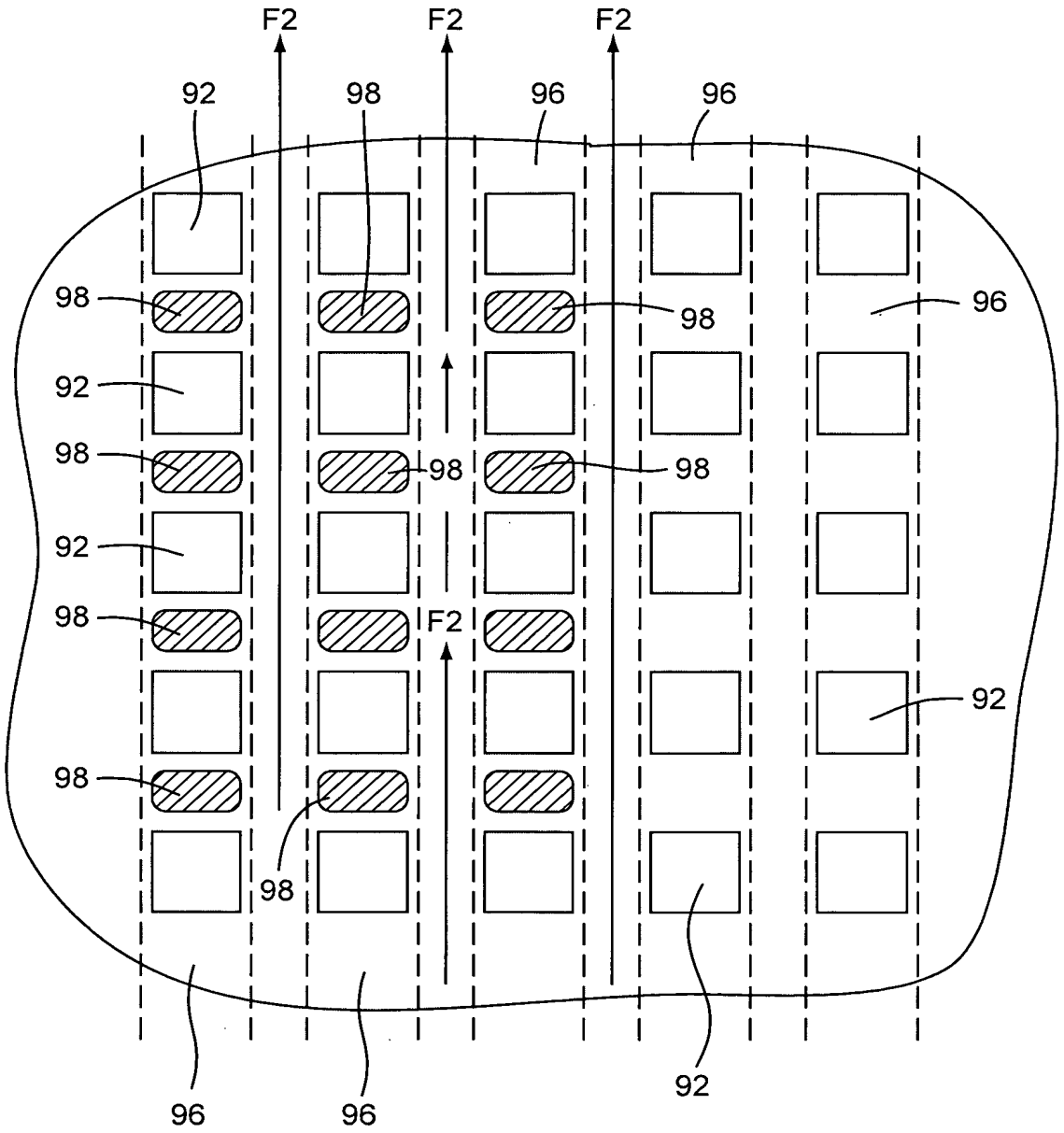


FIG. 17C

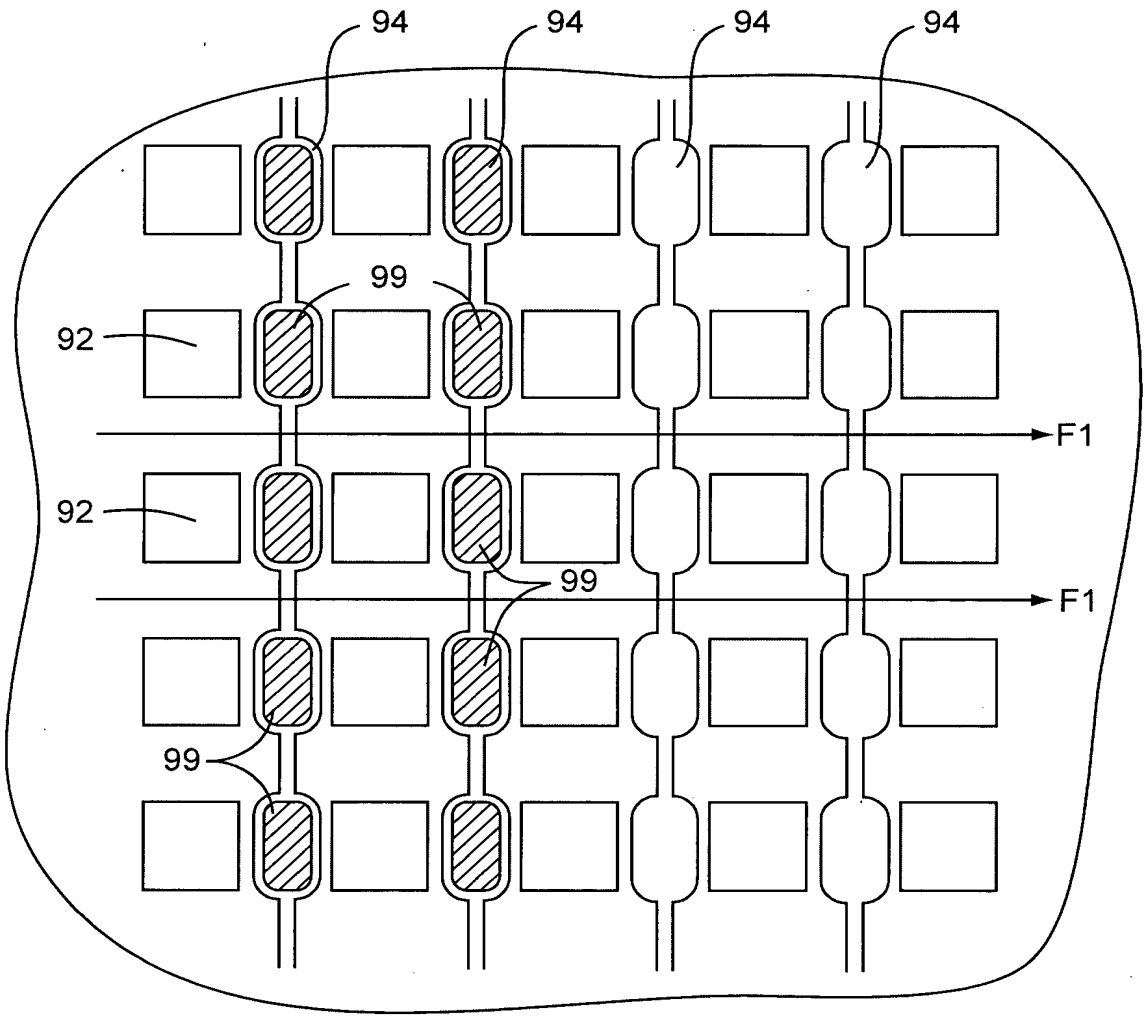


FIG. 17D

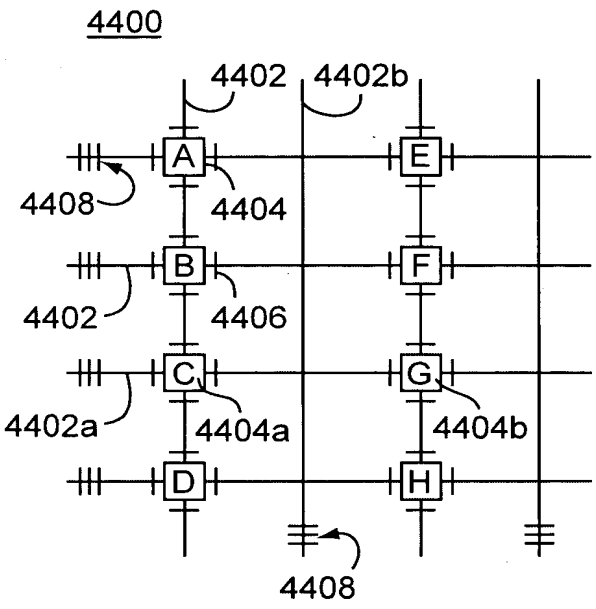


FIG. 18A

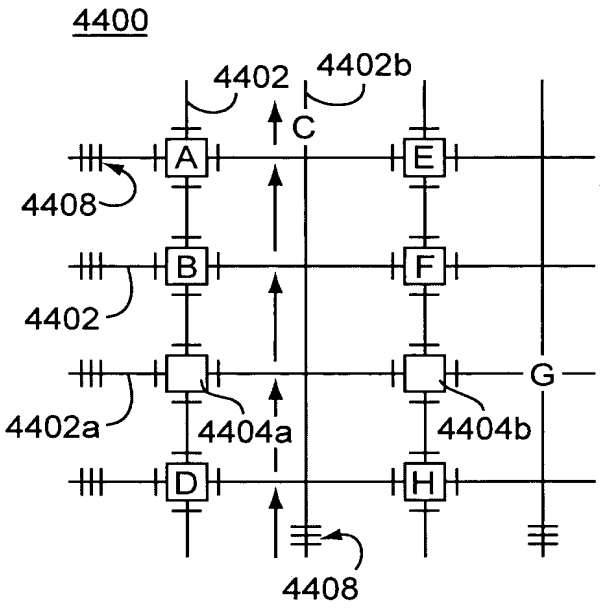


FIG. 18C

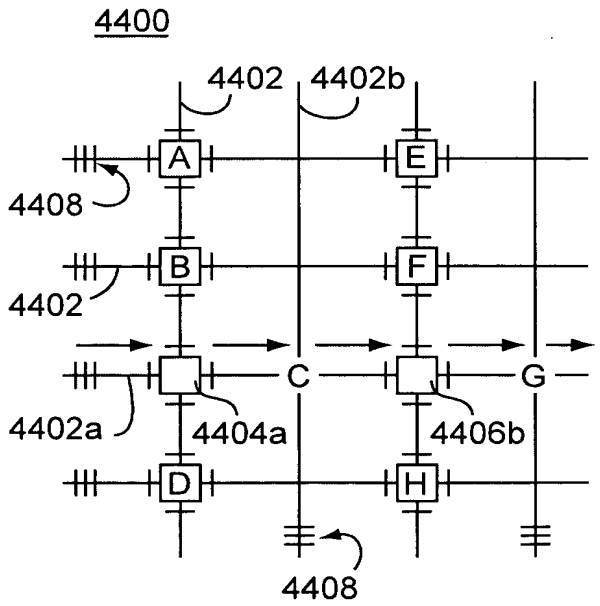


FIG. 18B

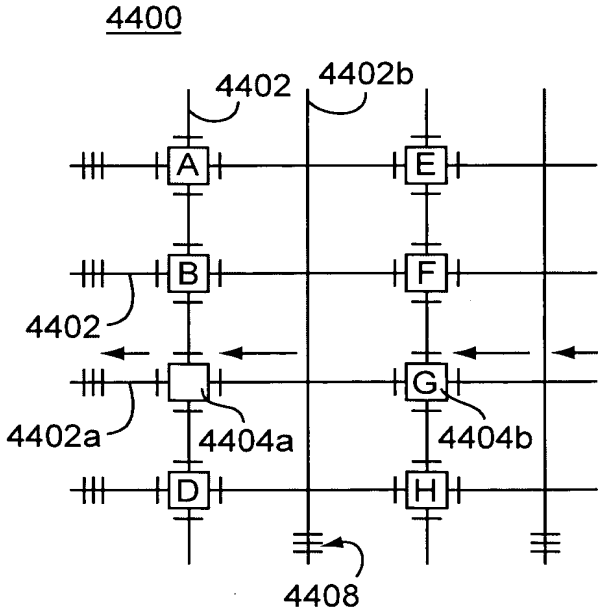


FIG. 18D

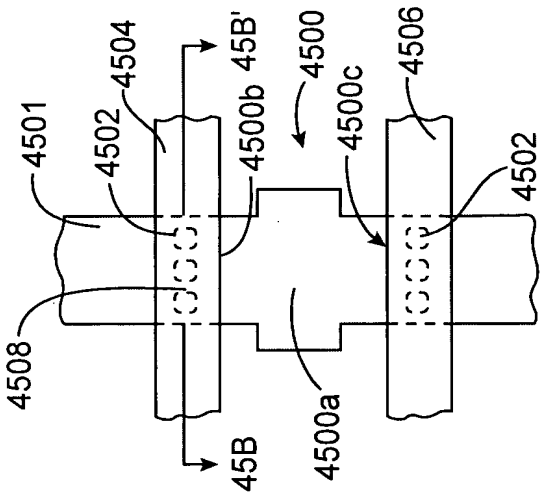


FIG. 19A

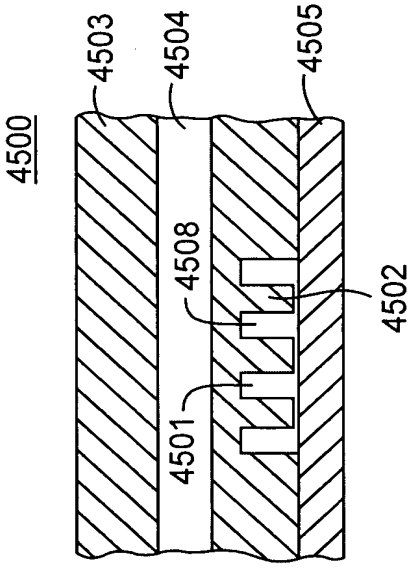


FIG. 19B

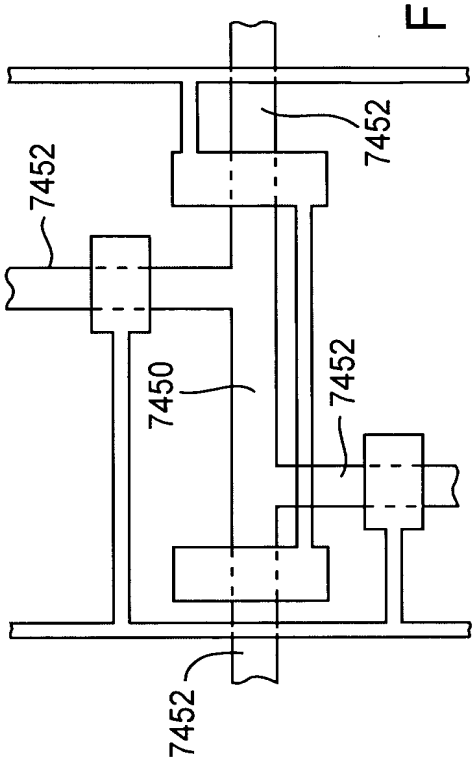


FIG. 20C

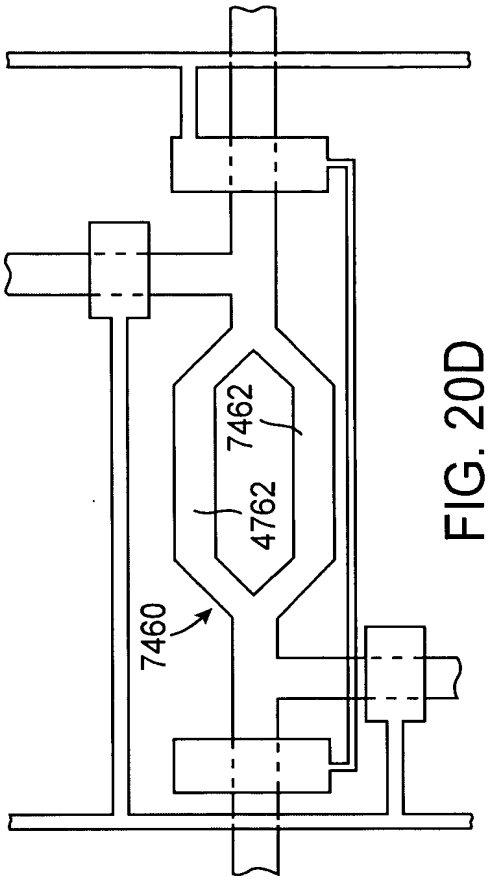


FIG. 20D

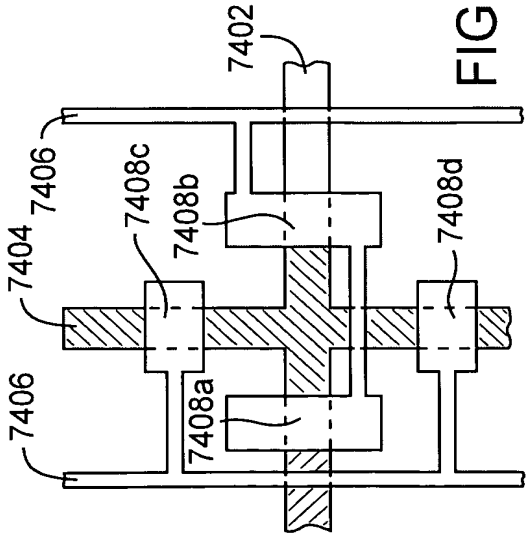


FIG. 20A

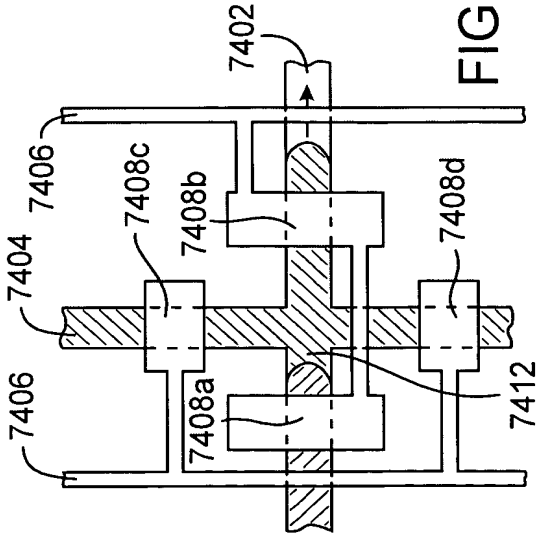


FIG. 20B

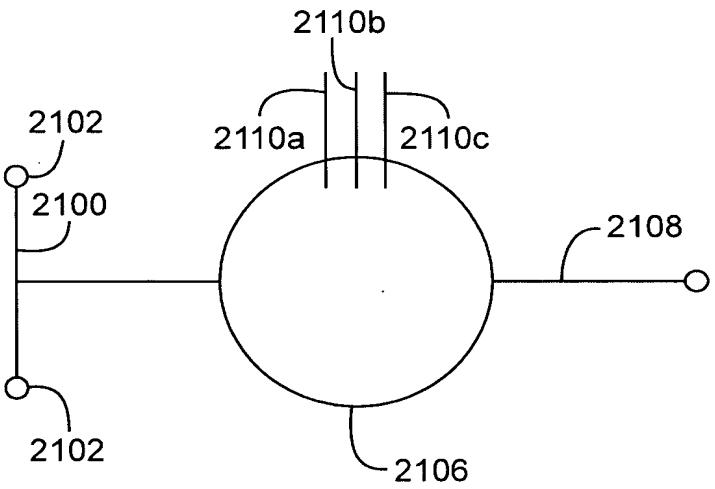


FIG. 21

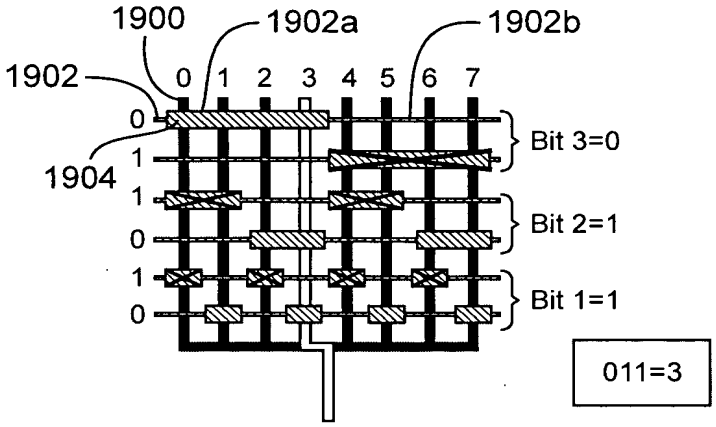


FIG. 22A

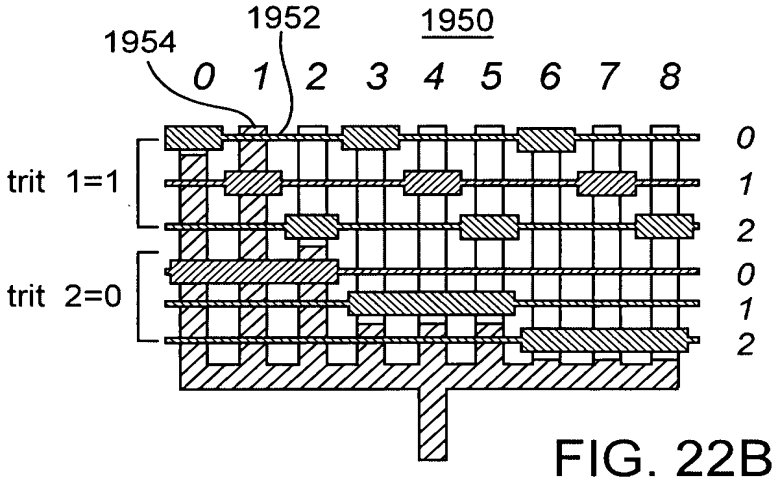


FIG. 22B

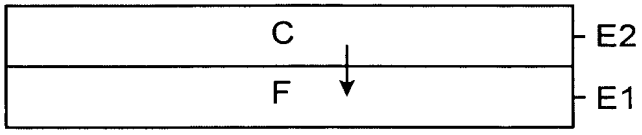


FIG. 22C

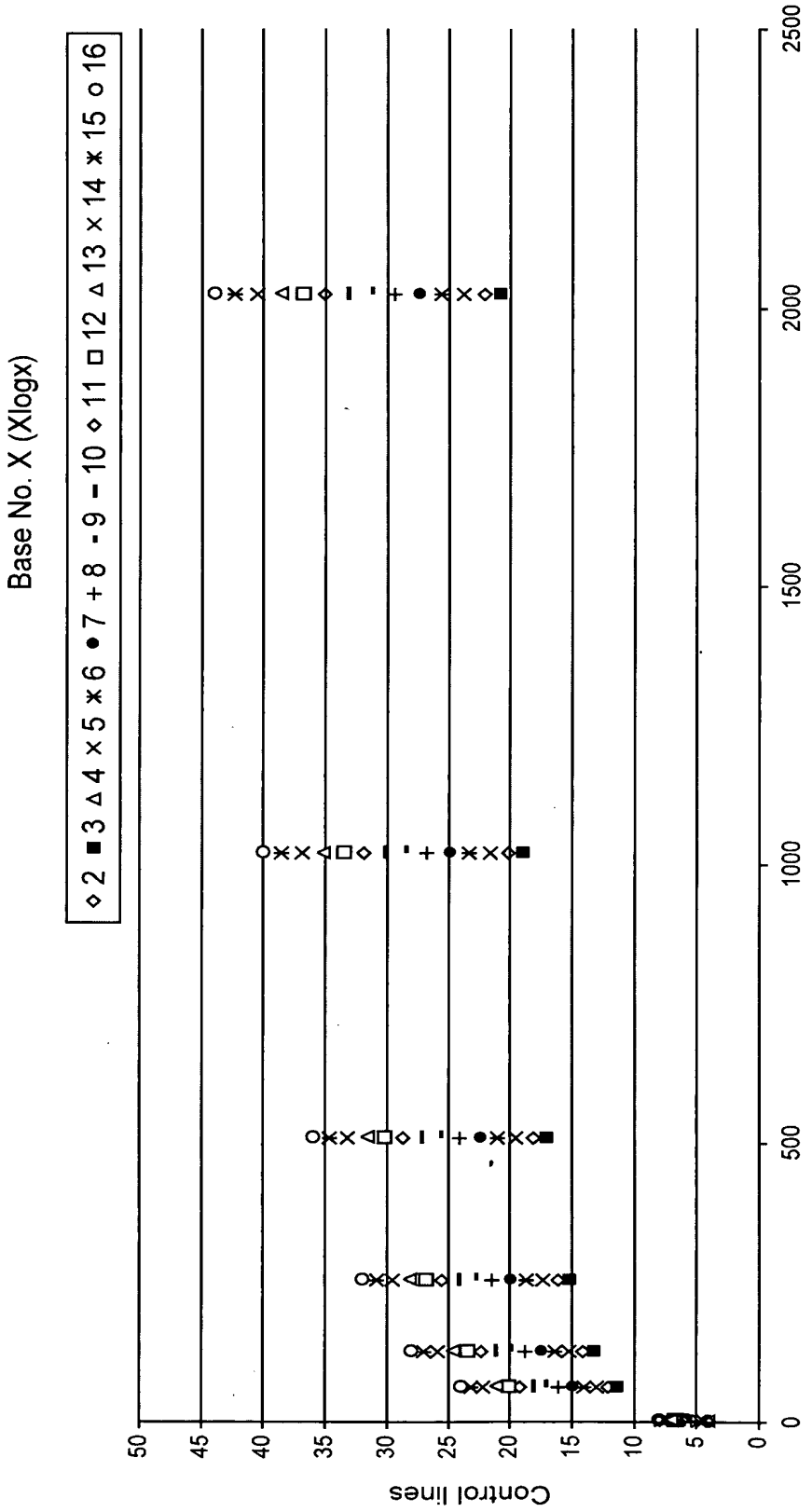

Base No. X (Xlogx)
◇ 2 ■ 3 △ 4 × 5 ✱ 6 ● 7 + 8 - 9 – 10 ◇ 11 □ 12 △ 13 × 14 ✱ 15 ○ 16
Control lines
50
45
40
35
30
25
20
15
10
5
0
Flow lines being controlled
0
500
1000
1500
2000
2500

FIG. 23

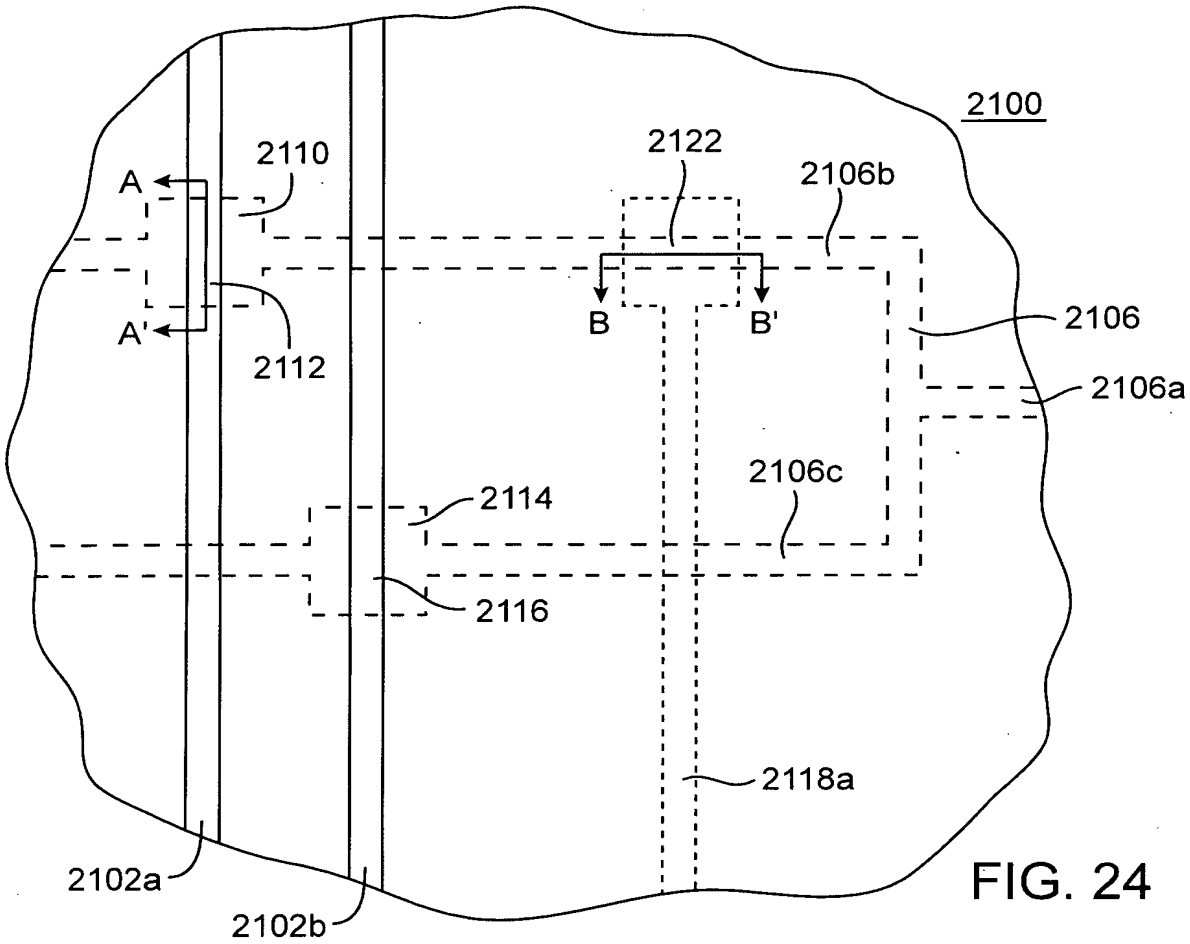


FIG. 24

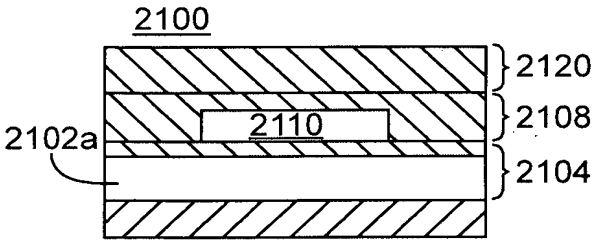


FIG. 24A

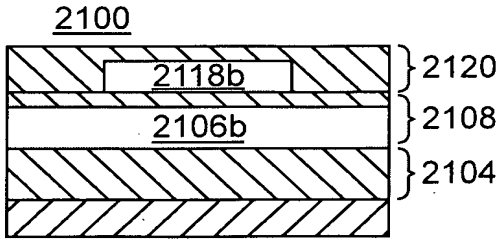


FIG. 24B

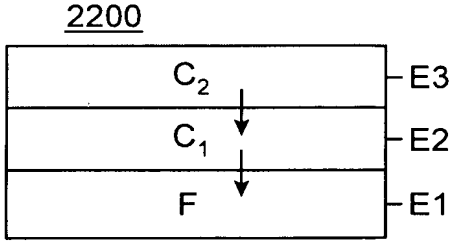


FIG. 25

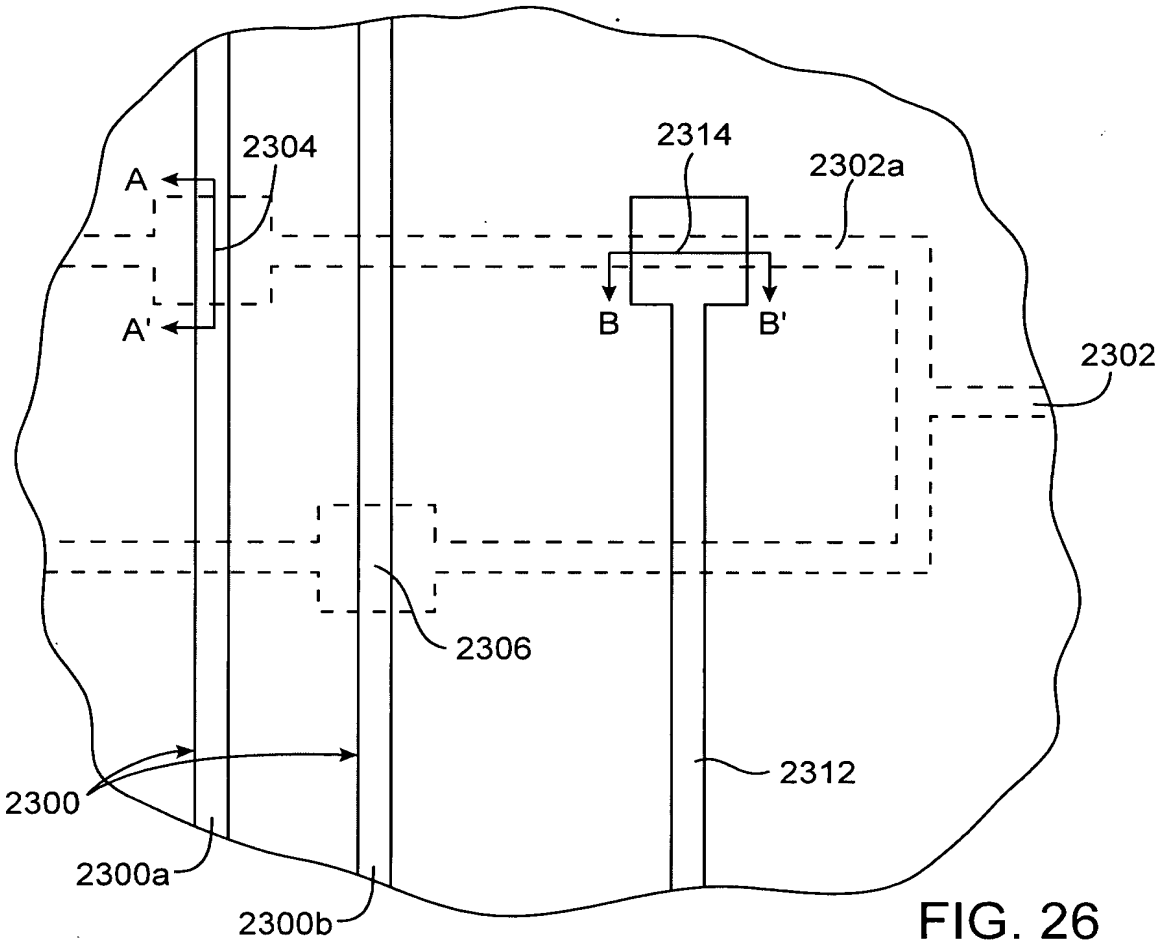


FIG. 26

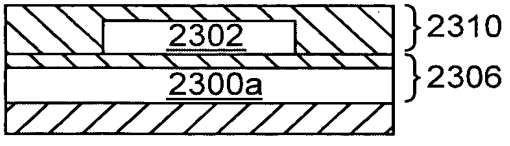


FIG. 26A

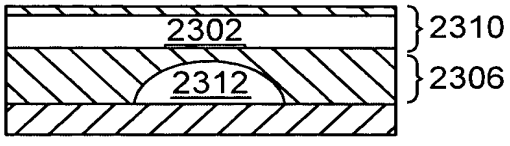


FIG. 26B

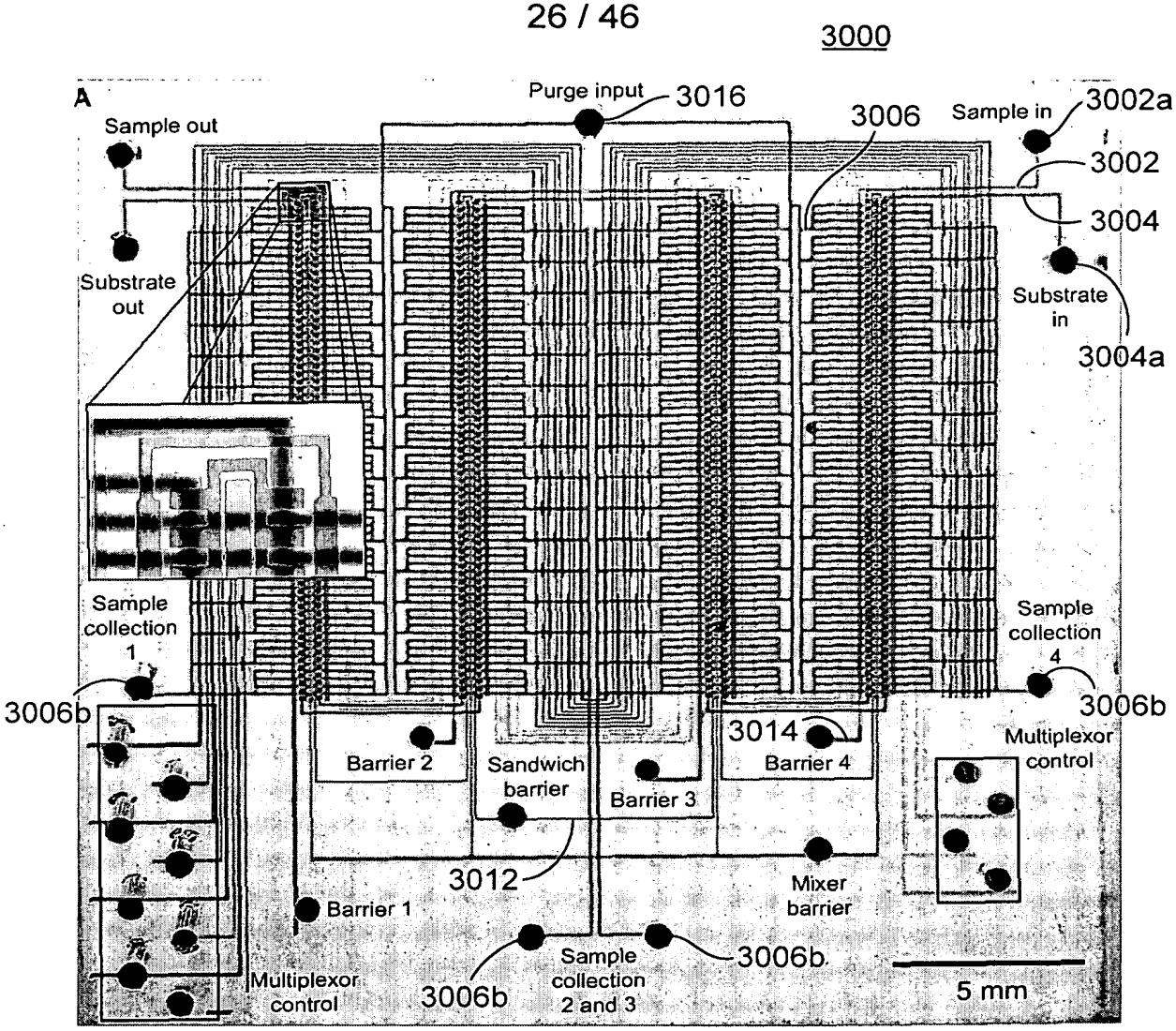


FIG. 27A

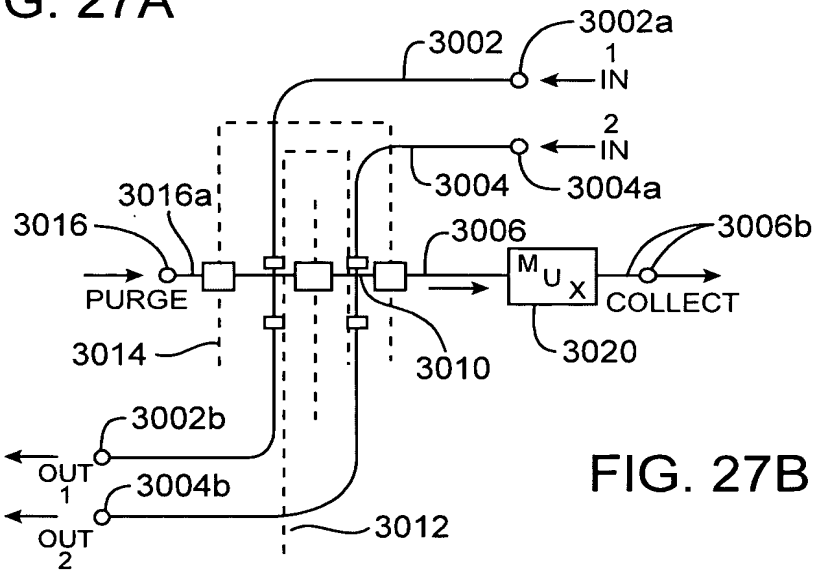


FIG. 27B

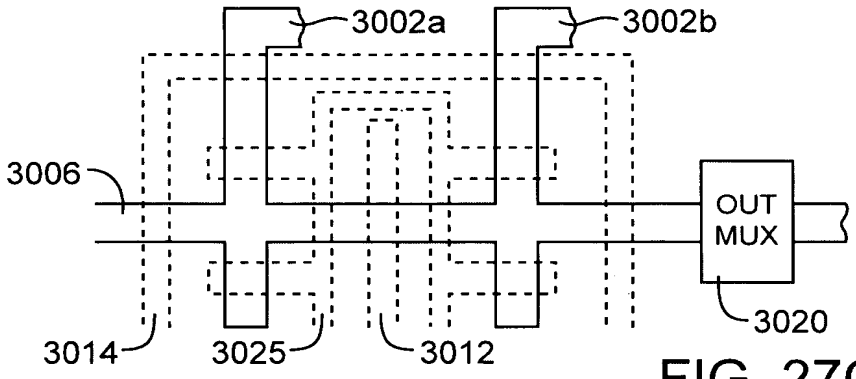


FIG. 27C

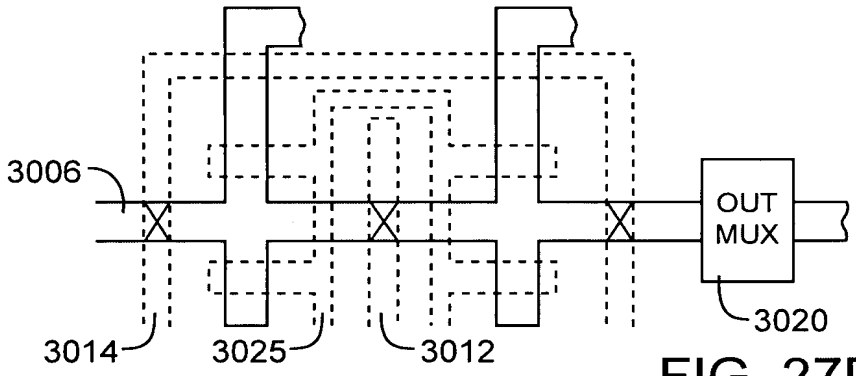


FIG. 27D

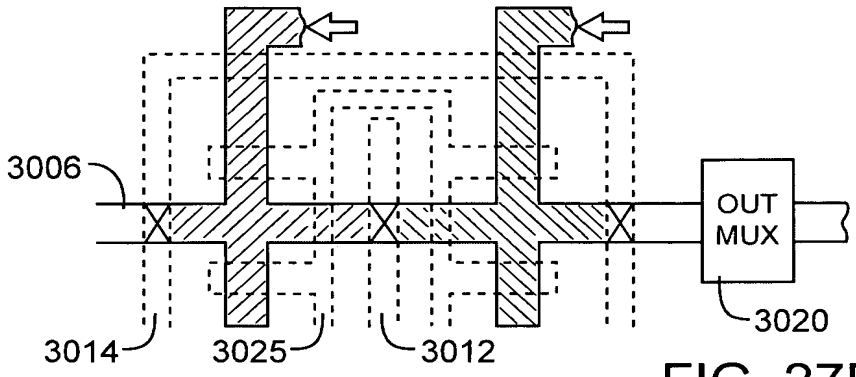


FIG. 27E

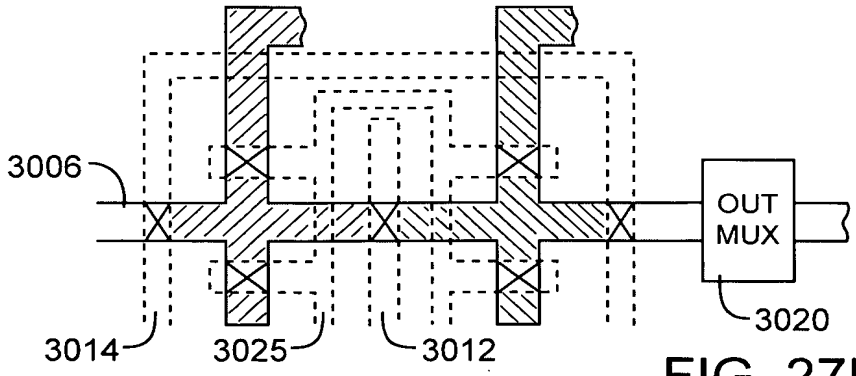


FIG. 27F

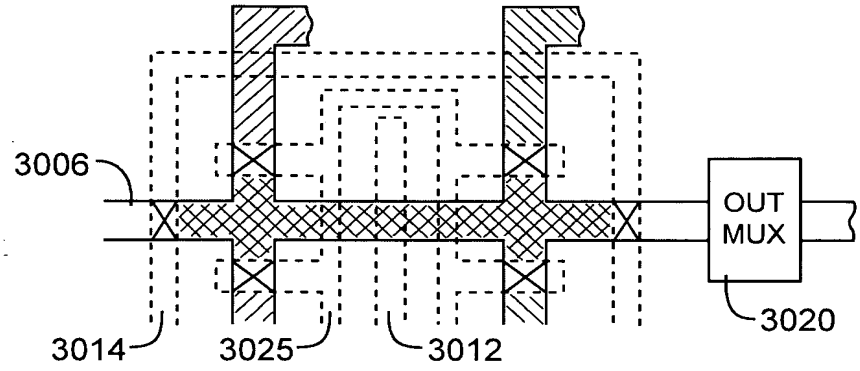


FIG. 27G

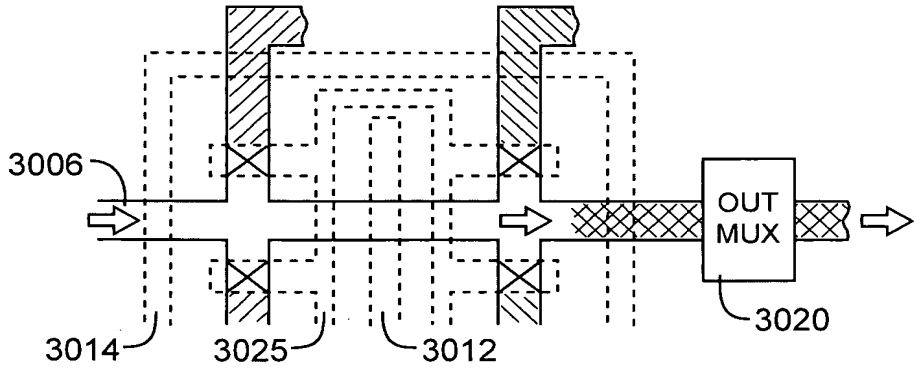


FIG. 27H

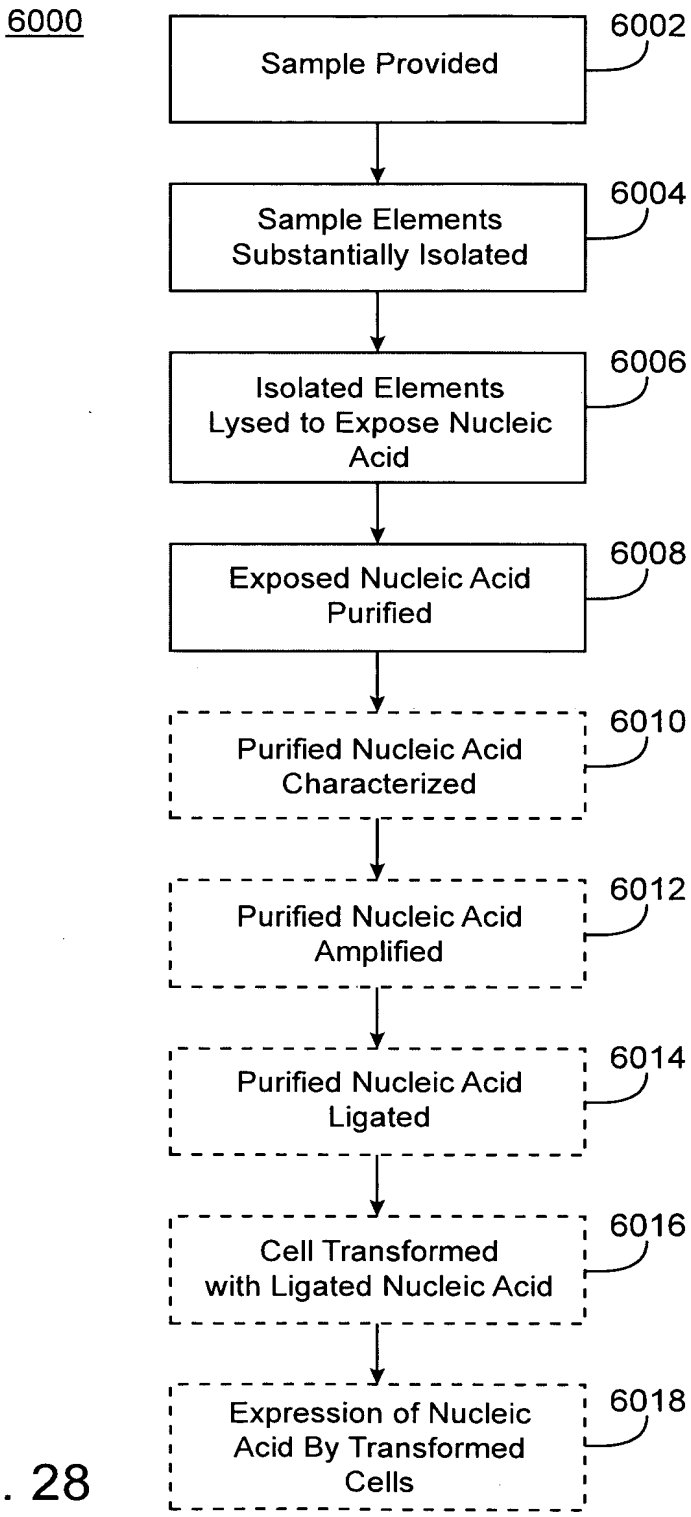

6000
Sample Provided
6002
Sample Elements Substantially Isolated
6004
Isolated Elements Lysed to Expose Nucleic Acid
6006
Exposed Nucleic Acid Purified
6008
Purified Nucleic Acid Characterized
6010
Purified Nucleic Acid Amplified
6012
Purified Nucleic Acid Ligated
6014
Cell Transformed with Ligated Nucleic Acid
6016
Expression of Nucleic Acid By Transformed Cells
6018

FIG. 28

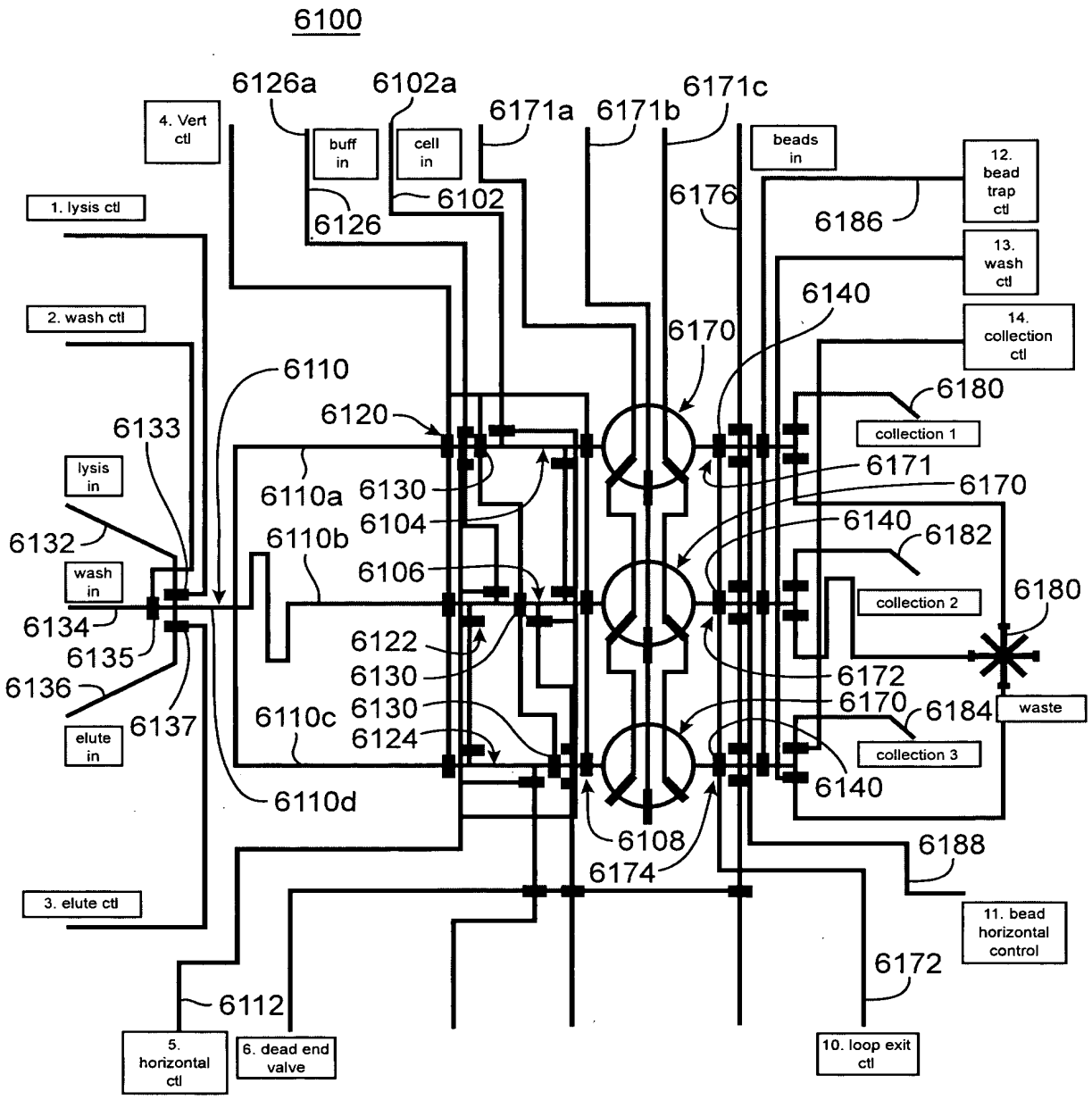

6100
6126a
6102a
6171a
6171b
6171c
4. Vert ctl
buff in
cell in
beads in
12. bead trap ctl
1. lysis ctl
6126
6102
6176
6186
13. wash ctl
2. wash ctl
6140
14. collection ctl
6170
6110
6180
6120
collection 1
6133
6171
lysis in
6110a
6130
6170
6104
6140
6132
6110b
6182
6106
wash in
collection 2
6180
6134
6122
6135
6130
6172
6136
6170
6184
waste
6130
6110c
6137
elute in
6124
collection 3
6140
6110d
6108
6188
6174
3. elute ctl
11. bead horizontal control
6172
6112
5. horizontal ctl
6. dead end valve
10. loop exit ctl

FIG. 29A

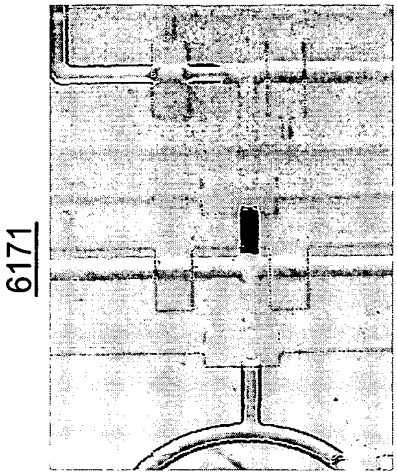


FIG. 29D

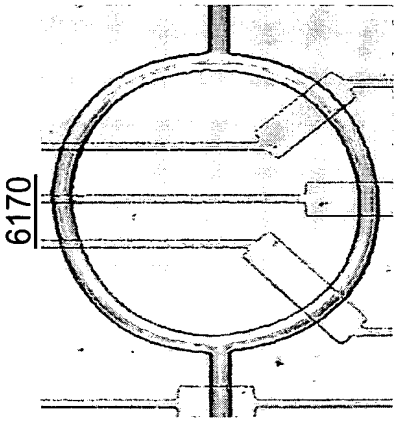


FIG. 29C

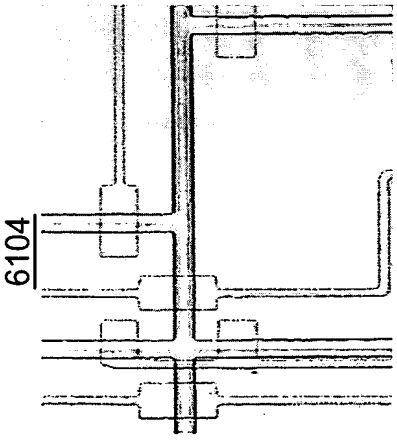


FIG. 29B

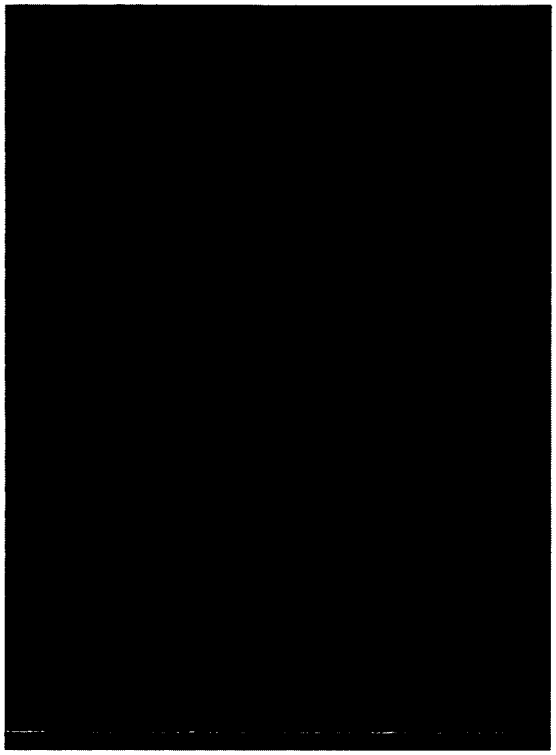


FIG. 30B

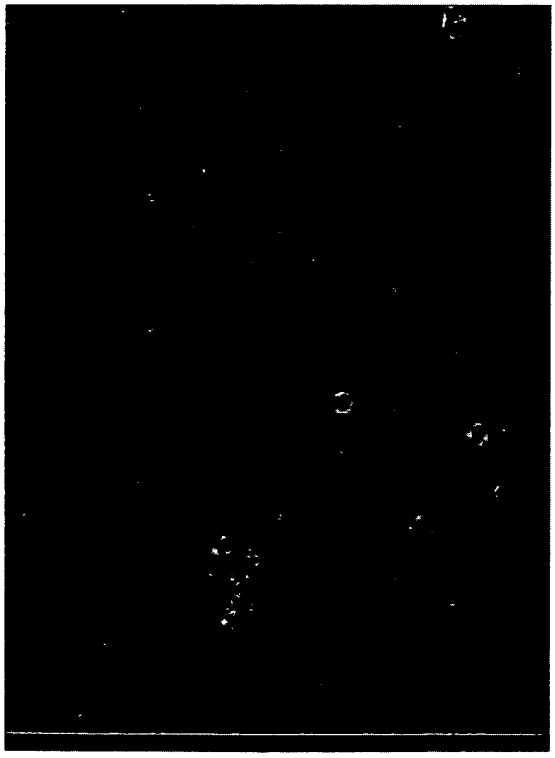


FIG. 30A

FIG. 31A

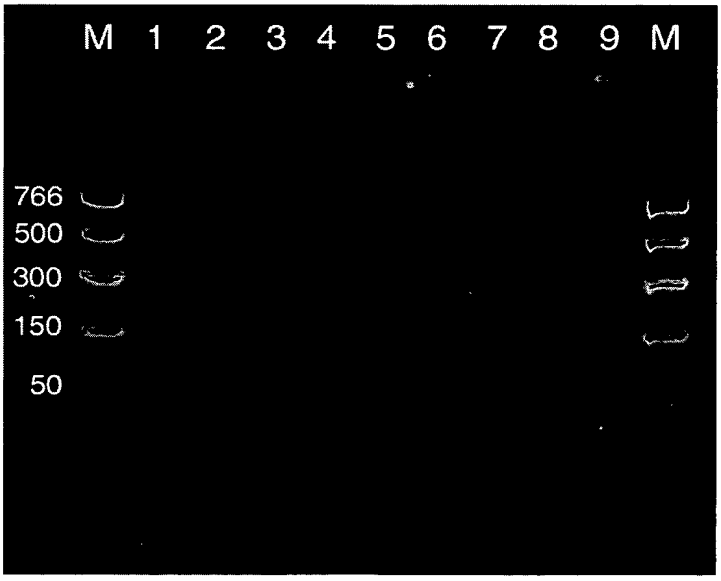


FIG. 31B

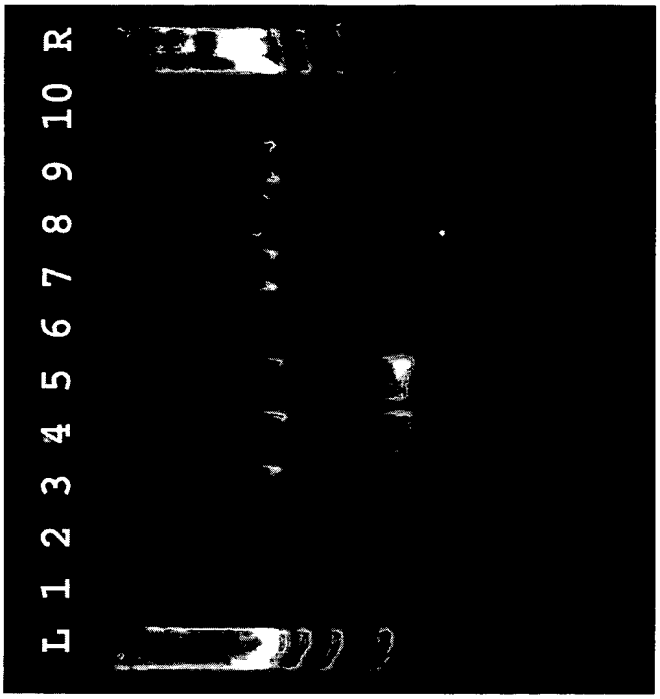


FIG. 32B

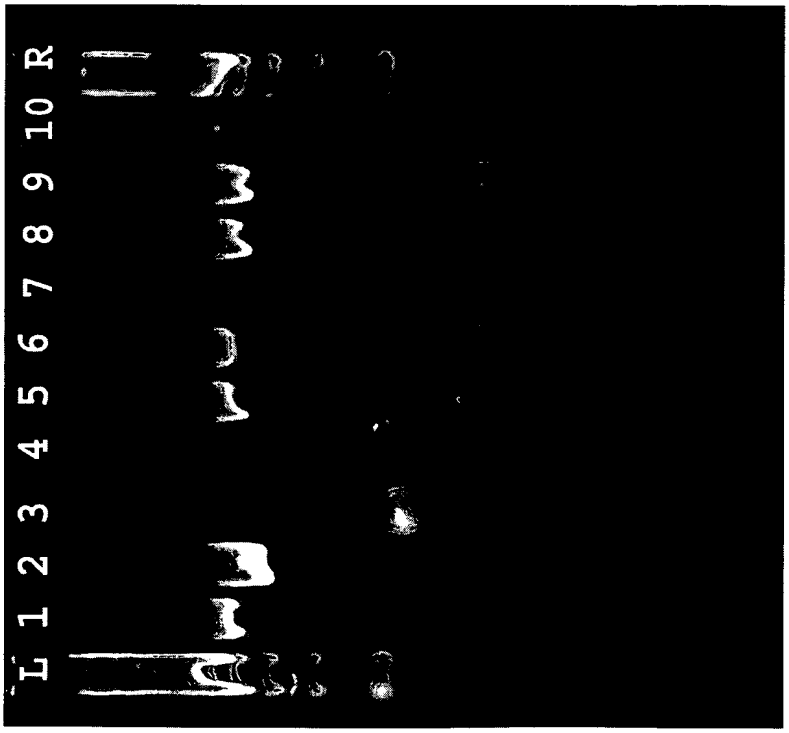


FIG. 32A

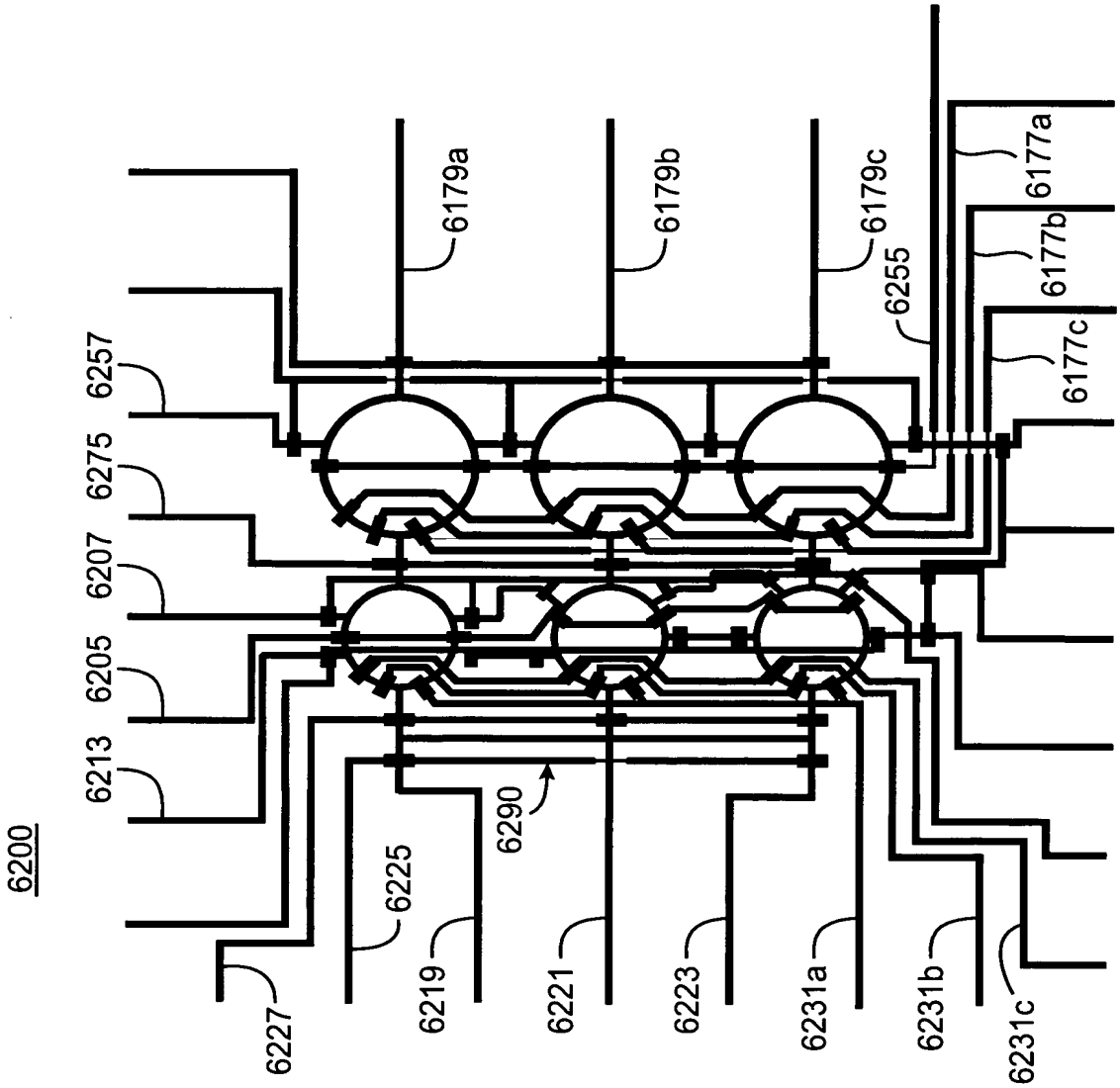

6200
6213
6205
6207
6275
6257
6179a
6179b
6179c
6255
6177a
6177b
6177c
6290
6225
6227
6219
6221
6223
6231a
6231b
6231c

FIG. 33

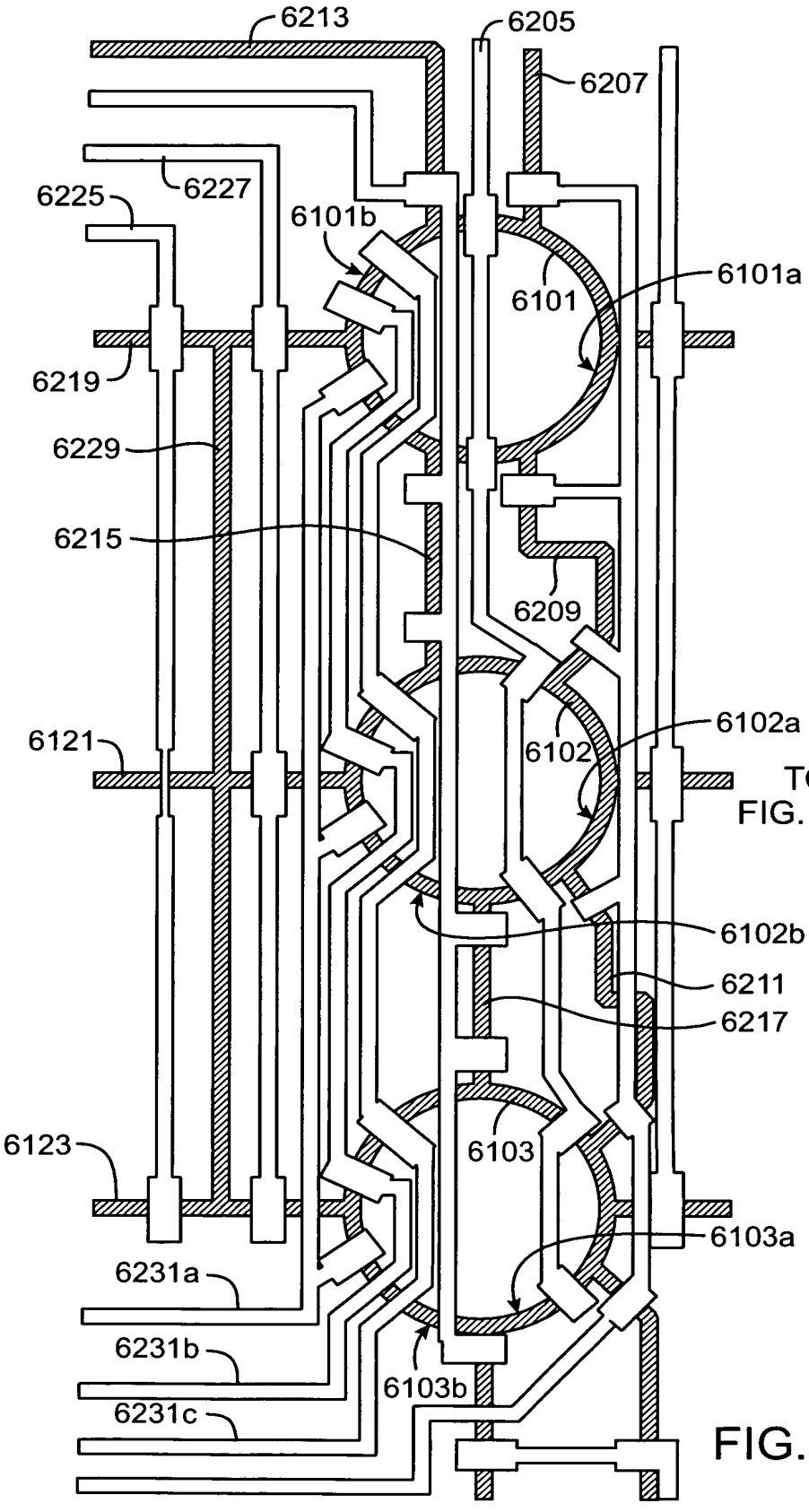

6213
6205
6207
6227
6225
6101b
6101
6101a
6219
6229
6215
6209
6121
6102
6102a
TO
FIG. 33B
6102b
6211
6217
6123
6103
6103a
6231a
6231b
6103b
6231c

FIG. 33A

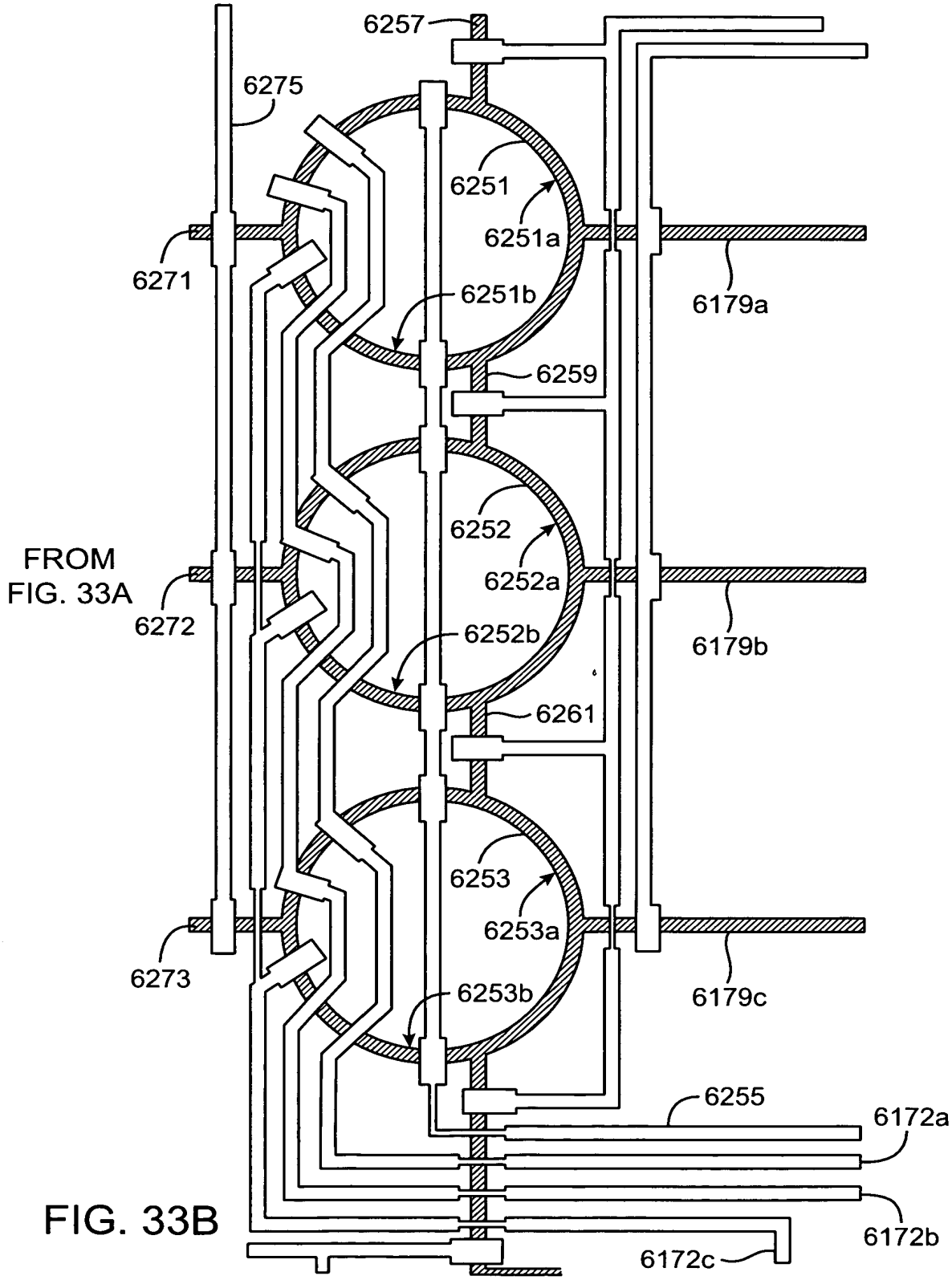

6257
6275
6251
6251a
6271
6251b
6179a
6259
6252
6252a
FROM
FIG. 33A
6272
6252b
6179b
6261
6253
6253a
6273
6253b
6179c
6255
6172a
6172b
6172c

FIG. 33B

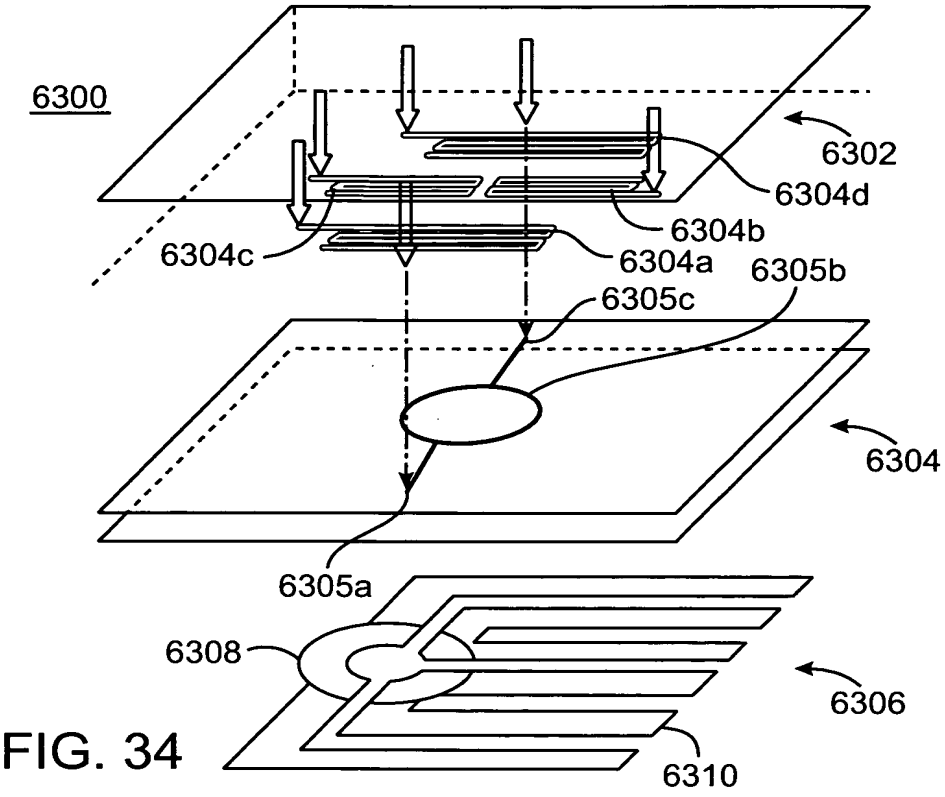

6300
6302
6304d
6304b
6304c
6304a
6305b
6305c
6304
6305a
6308
6306
6310

FIG. 34

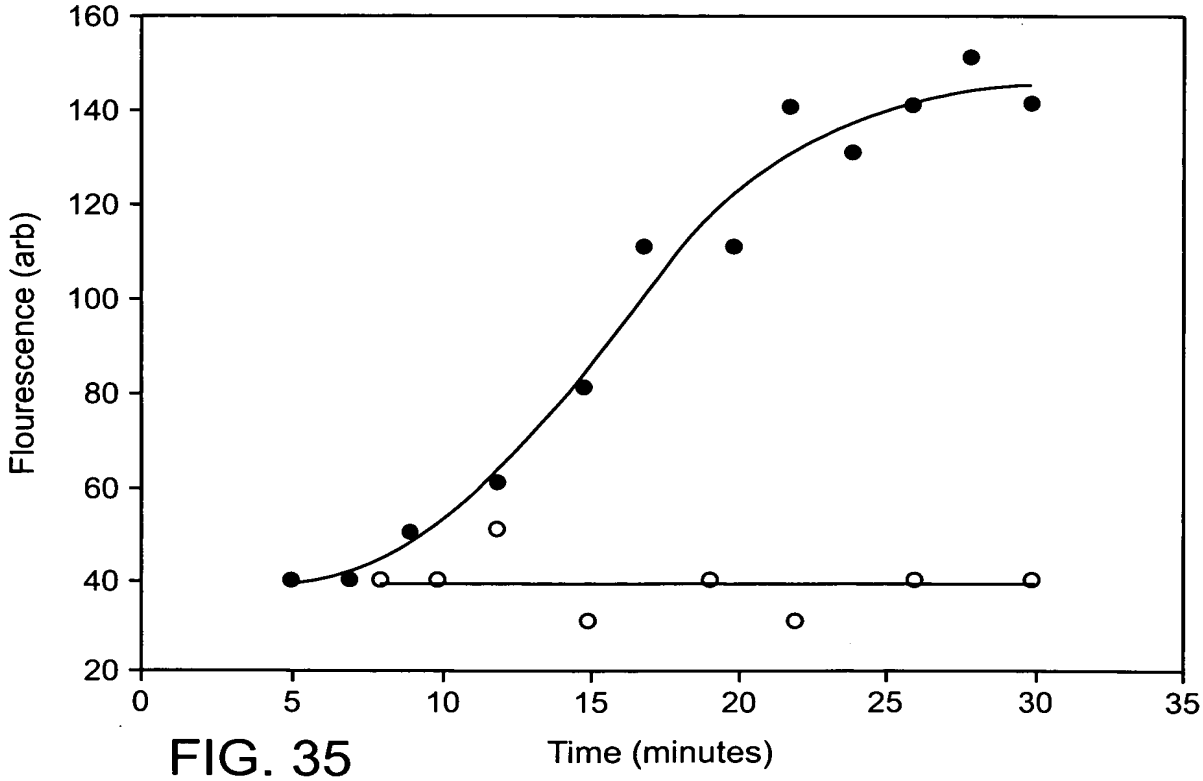

160
140
120
100
80
60
40
20
Flourescence (arb)
0
5
10
15
20
25
30
35
Time (minutes)

FIG. 35

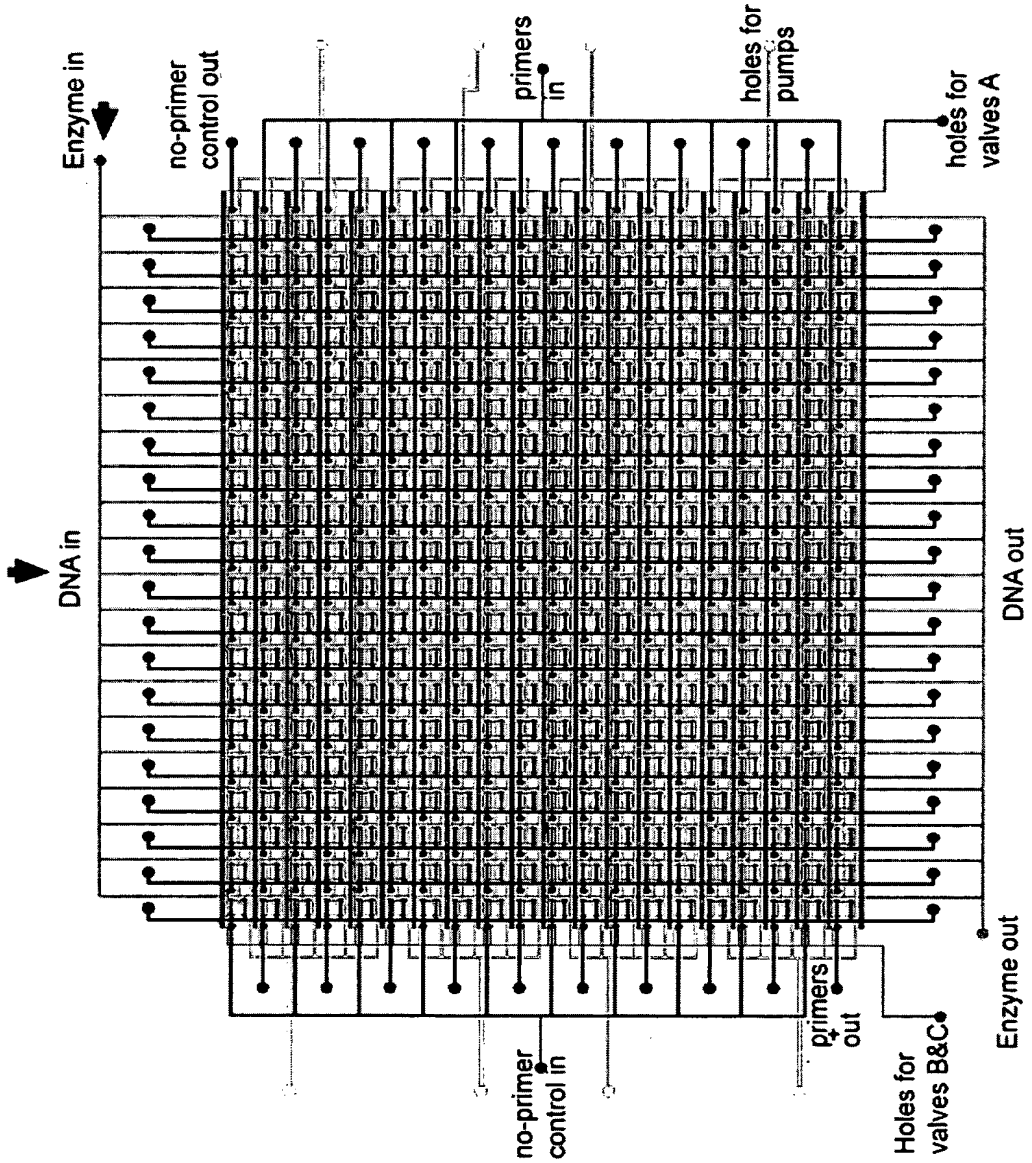

Enzyme in
no-primer control out
primers in
holes for pumps
holes for valves A
DNA in
DNA out
Enzyme out
primers out
Holes for valves B&C
no-primer control in

FIG. 36A

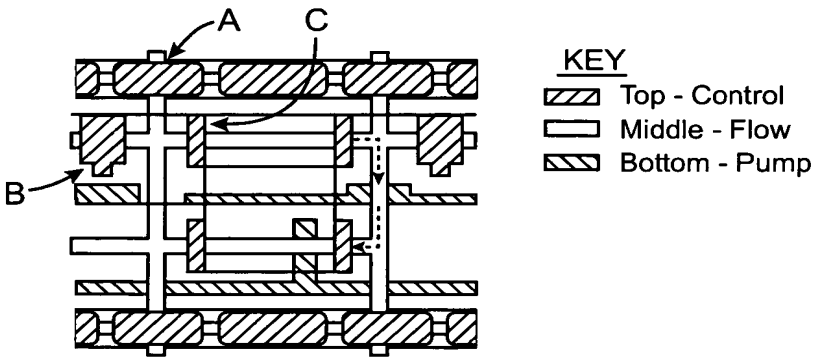


FIG. 36B

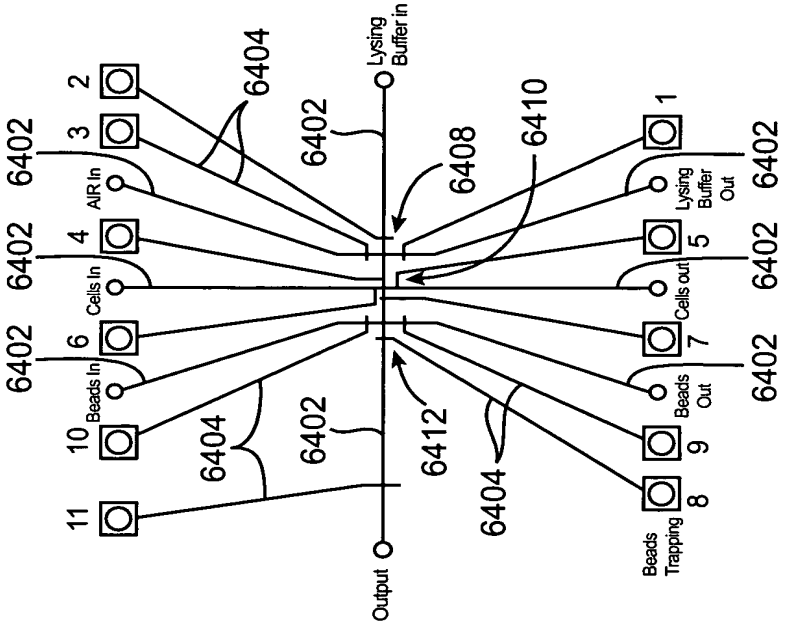

Lysing Buffer in
Output
AIR In
Cells In
Beads In
Lysing Buffer Out
Cells out
Beads Out
Beads Trapping
1
2
3
4
5
6
7
8
9
10
11
6402
6404
6408
6410
6412

FIG. 37A

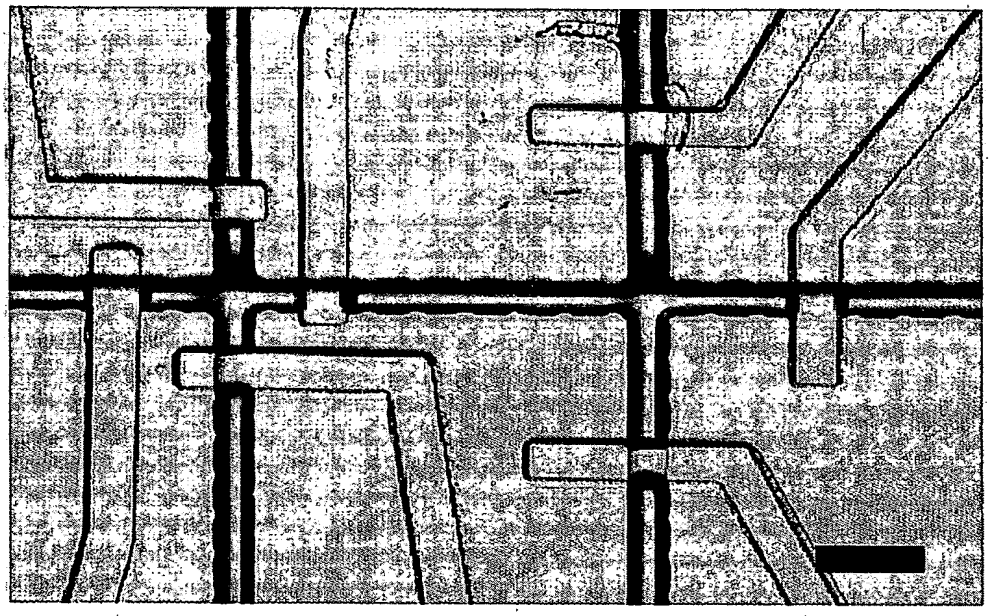


FIG. 37B

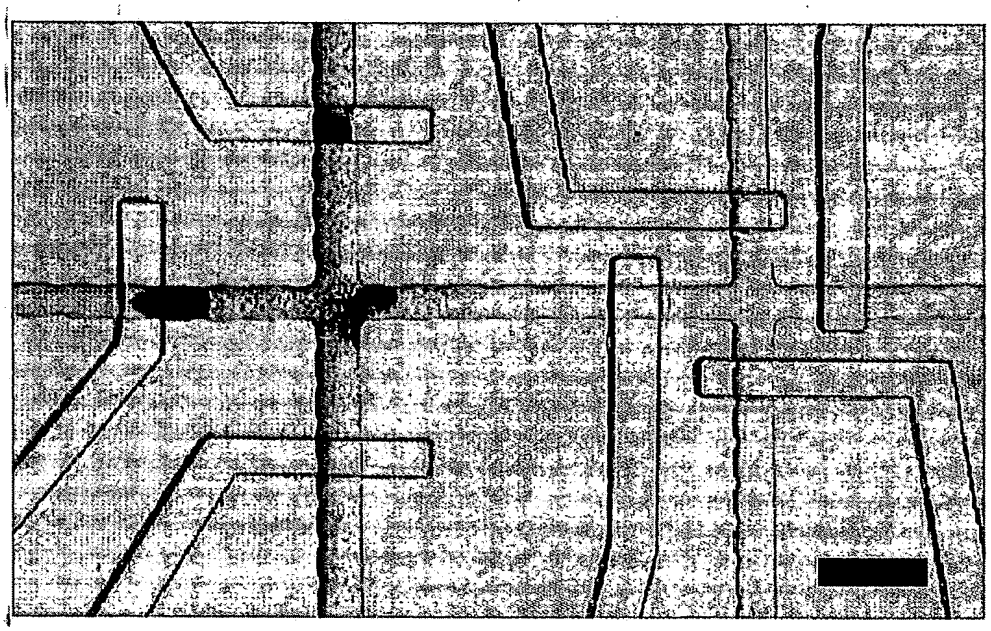


FIG. 37C

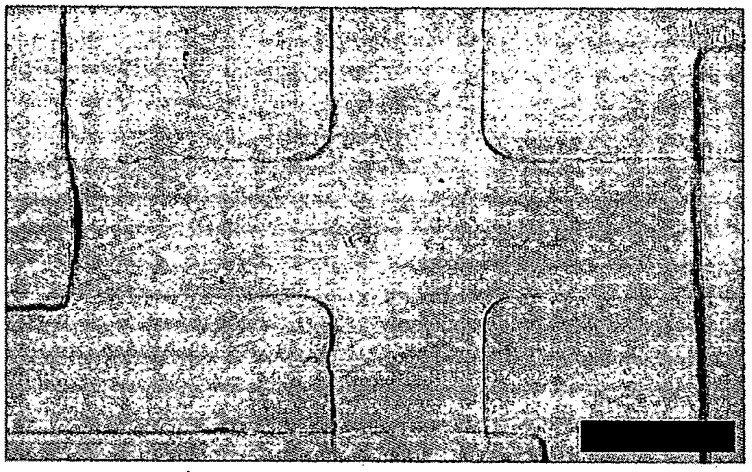


FIG. 37D

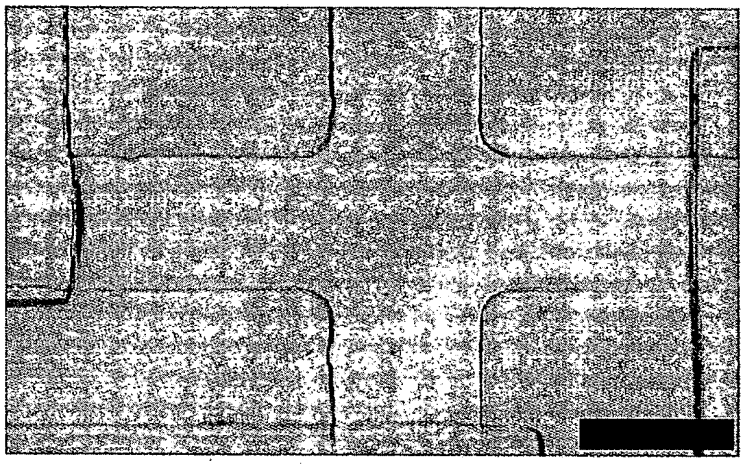


FIG. 37E

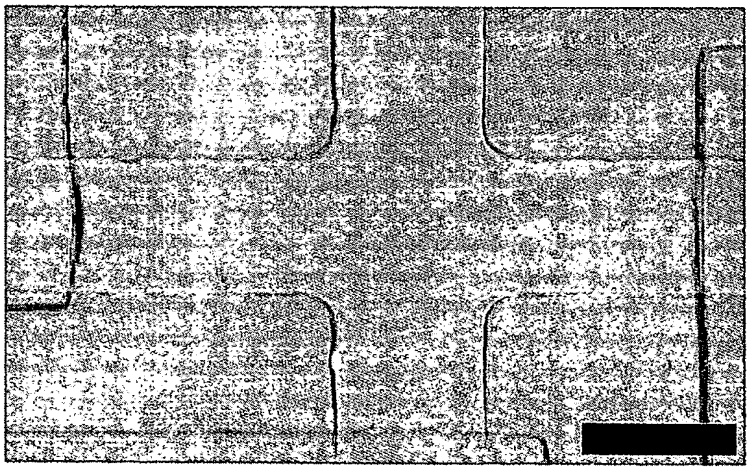


FIG. 37F

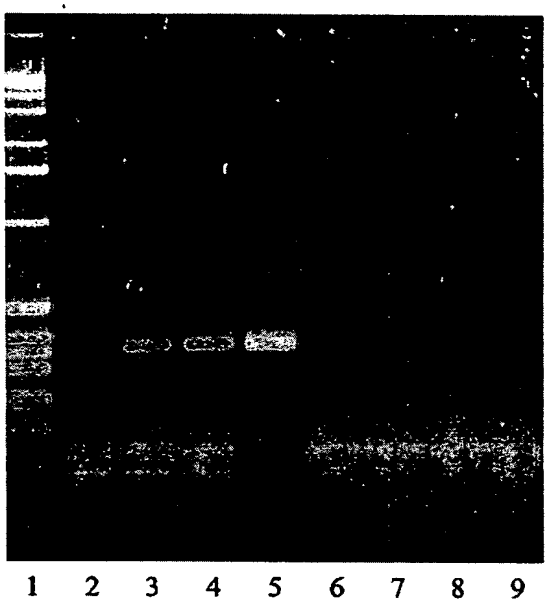

1 2 3 4 5 6 7 8 9

FIG. 38

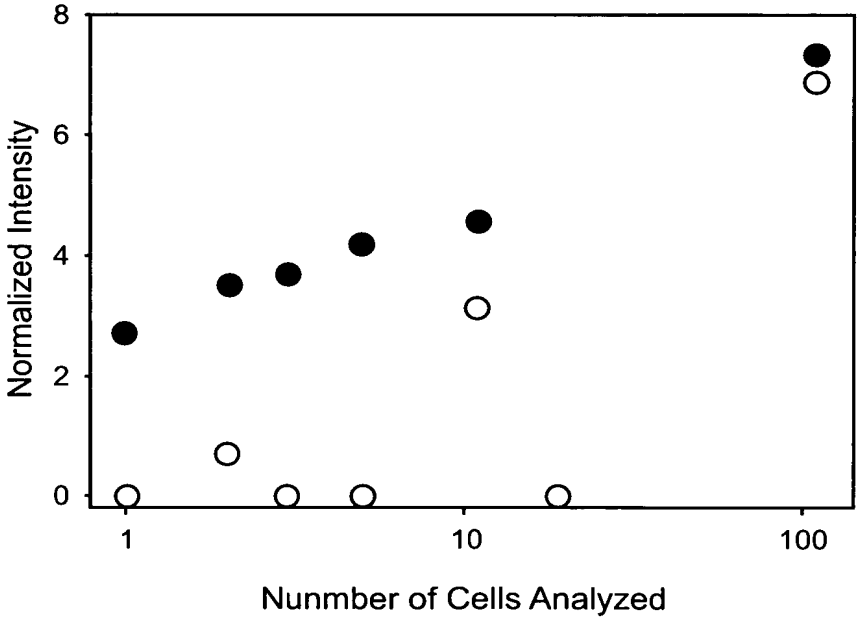

8
6
4
2
0
Normalized Intensity
1
10
100
Nunmber of Cells Analyzed

FIG. 39

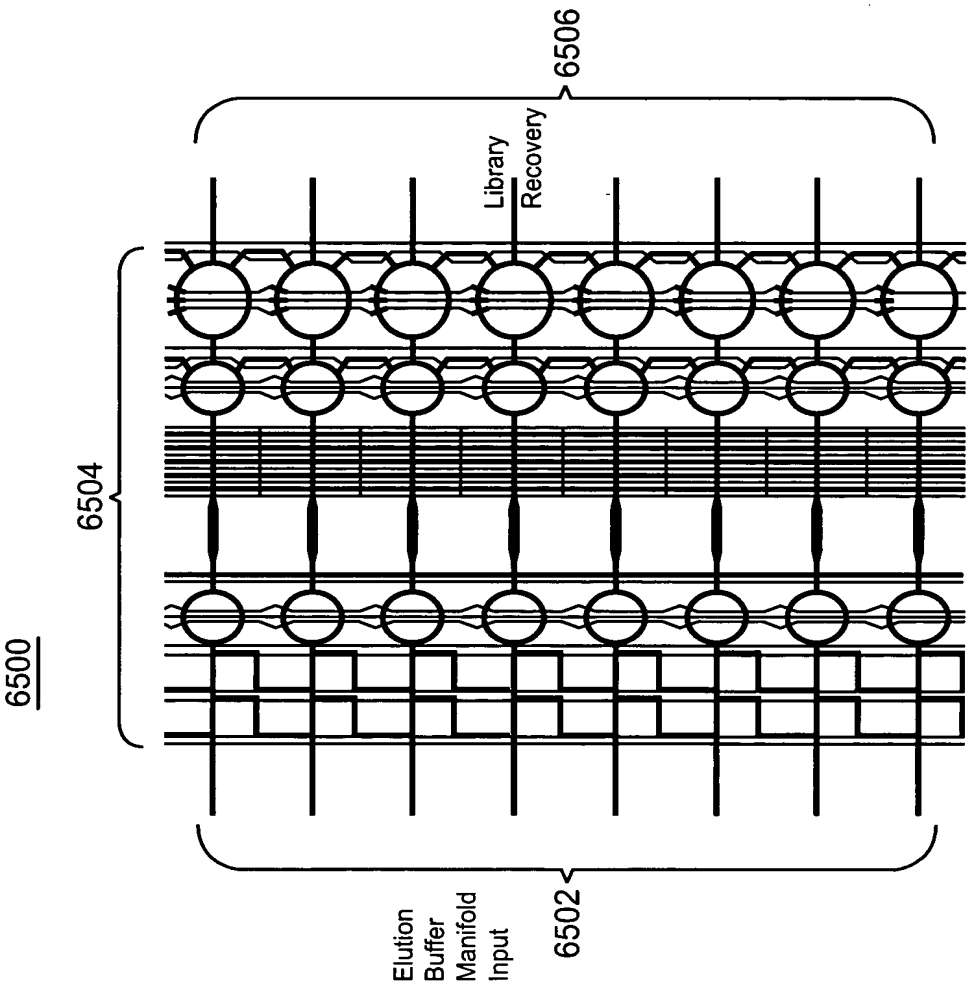

6506
Library Recovery
6504
6500
Elution Buffer Manifold Input
6502

FIG. 40

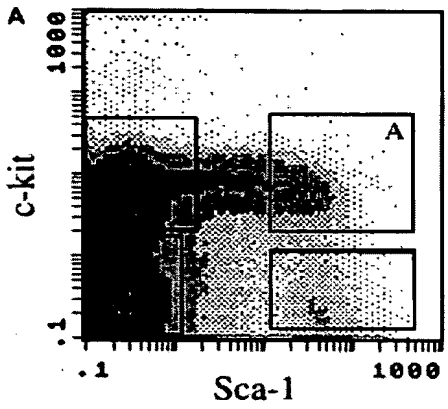


FIG. 41A

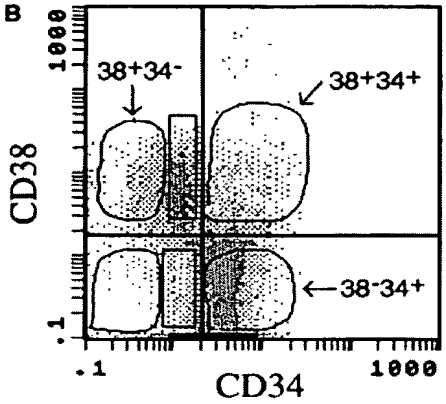


FIG. 41B

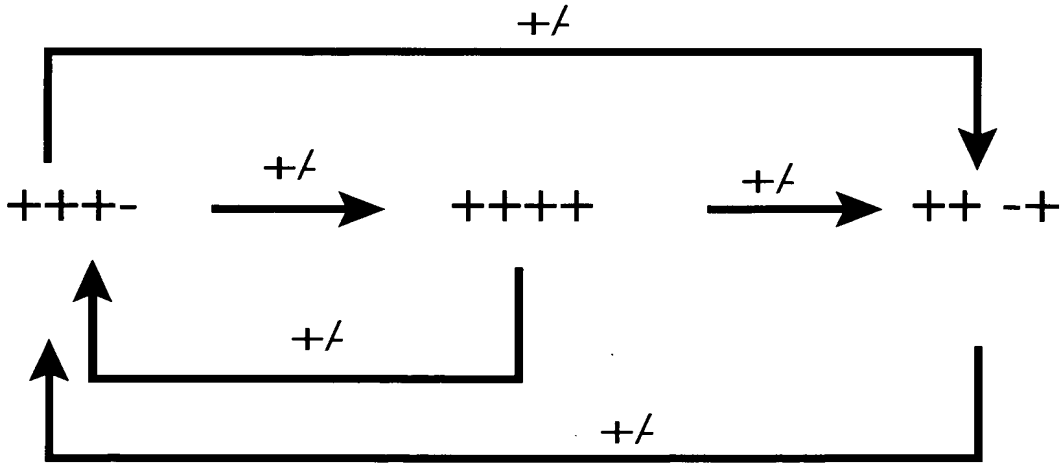


FIG. 42

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